



# **DRAFT**

# **ENVIRONMENTAL IMPACT**

# **STATEMENT**

## **CONTINUED USE OF PUBLIC LANDS**

## **AT THE LUKE AIR FORCE RANGE, ARIZONA**

**DEPARTMENT OF THE INTERIOR**  
**BUREAU OF LAND MANAGEMENT**



PREPARED BY  
BUREAU OF LAND MANAGEMENT  
DEPARTMENT OF THE INTERIOR  
AND  
DEPARTMENT OF THE AIR FORCE

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## BUREAU OF LAND MANAGEMENT

ARIZONA STATE OFFICE  
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PHOENIX, ARIZONA 85073

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1980

Enclosed for your review and comment is the draft environmental impact statement for the proposed renewal of the Luke Air Force Range.

The statement is based on information from the U.S. Air Force, Bureau of Land Management, and other sources, including information supplied by and in consultation with Federal, State, and local agencies, and interested individuals and private organizations. The purpose of the statement is to disclose in advance the probable environmental impacts of the proposed action and its alternatives, and to assure that these factors are considered along with economic, technical, and other considerations in the decisionmaking process.

We would appreciate receiving your comments on the environmental impacts of the proposed action. The comment period will run for 60 days after notice of receipt is published in the Federal Register. The draft is filed with the Environmental Protection Agency and the notice is anticipated in July 1980. Comments received after the 60-day review period will be considered in the subsequent decisionmaking process, even though they may be too late for inclusion in the final environmental impact statement.

Your comments should be sent to:

Bureau of Land Management  
Arizona State Director (920)  
2400 Valley Bank Center  
Phoenix, Arizona 85073

Sincerely,

State Director

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# United States Department of the Interior

Division of Reclamation

Washington, D.C.  
20540



Very truly yours,  
[Signature]

The enclosed report contains information regarding the proposed project in the State of California. The project is located in the County of [County Name] and is situated on the [Location]. The project is a [Type of Project] and is intended to [Purpose of Project]. The project is being undertaken by [Name of Entity] and is being funded by [Source of Funding]. The project is expected to be completed by [Completion Date]. The project is expected to have a positive impact on the [Area of Impact]. The project is expected to create [Number of Jobs] jobs and to generate [Amount of Revenue] in revenue for the State of California. The project is expected to have a positive impact on the [Area of Impact]. The project is expected to create [Number of Jobs] jobs and to generate [Amount of Revenue] in revenue for the State of California.

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Very truly yours,  
[Signature]

Special Agent in Charge  
[Name]  
[Address]  
[City, State, ZIP]

[Signature]

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DEPARTMENT OF THE INTERIOR

Draft  
Environmental Impact Statement

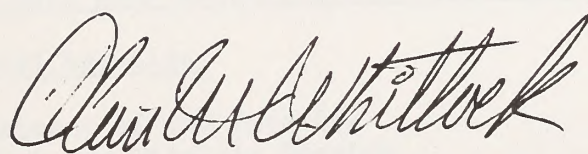
CONTINUED USE OF PUBLIC LANDS  
AT THE LUKE AIR FORCE RANGE, ARIZONA

prepared by

BUREAU OF LAND MANAGEMENT  
DEPARTMENT OF THE INTERIOR

and

DEPARTMENT OF THE AIR FORCE



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STATE OF LAND MANAGEMENT

## SUMMARY

Draft (X) Final ( ) Environmental Statement

1. TYPE OF ACTION: Administrative ( ) Legislative (X)

2. BRIEF DESCRIPTION OF ACTION: The United States Air Force has applied for a 20-year renewal of a 502,792-acre withdrawal on the Luke Air Force Range (LAFR) in Arizona. LAFR consists of 2,669,225 acres and includes the Cabeza Prieta National Wildlife Refuge (NWR), which is managed by the U. S. Fish and Wildlife Service. Associated with the proposed withdrawal, the Air Force and Marine Corps plan to upgrade target facilities and install telemetry equipment to improve aircrew training.

If the withdrawal is granted, the Air Force would continue operating the range under memorandums of understanding with the Department of Interior and other Federal and State agencies.

3. SUMMARY OF ENVIRONMENTAL IMPACTS: Public use of and access to the LAFR and the Cabeza Prieta NWR would continue to be restricted. Among the probable uses forgone on public land would be recreation, livestock grazing, and mineral exploration and development. Recreation would be forgone on the refuge.

Low-level overflight and sonic booms would detract from the wilderness experience of visitors to the national wildlife refuge, and towed target debris would detract from the refuge's visual resources.

Military activities have disturbed the surface on 9,500 acres; an additional 3,300 acres would be disturbed by construction and operation of the range. No additional acres on the refuge, however, would be disturbed. Adverse impacts would include soil disturbance or loss, vegetation removal, and loss of wildlife habitat. Altering 3,300 acres of habitat could result in some wildlife losses.

4. ALTERNATIVES CONSIDERED:

1. No action.
2. Reduce the size of the withdrawal.
3. Establish a new range in another location.

5. COMMENTS HAVE BEEN REQUESTED FROM THE FOLLOWING:

a. Federal Agencies

Department of the Interior  
Fish and Wildlife Service  
Geological Survey  
Bureau of Mines  
National Park Service  
Heritage Conservation and Recreation Service  
Bureau of Indian Affairs

Department of Agriculture  
Soil Conservation Service

Department of Defense  
Corps of Engineers  
Marine Corps

Department of Housing and Urban Development

Environmental Protection Agency

Department of Transportation  
Federal Aviation Administration

Department of Health and Human Services

Department of Energy

Advisory Council on Historic Preservation

b. State of Arizona

Clearinghouse  
Bureau of Mines  
Historic Preservation Officer  
Game and Fish Department  
Office of Economic Planning and Development

c. Counties

Maricopa  
Pima  
Yuma

d. Municipalities

City of Yuma  
Gila Bend  
Town of Ajo  
Town of Wellton  
Town of Somerton

e. Private and Public Interest Groups--See chapter 9 for the complete list.

DATE DRAFT STATEMENT MADE AVAILABLE TO EPA AND THE PUBLIC: August 1980

DEPARTMENT OF THE INTERIOR

DISCLAIMER

The environmental impact statement on the withdrawal of public land for use by the Department of the Air Force has been cooperatively prepared by the Department of the Air Force and the Bureau of Land Management. Chapter 10, portions of Chapter 1, and other information relating to Air Force mission objectives and continued need for the facility are included to meet Air Force and Marine Corps requirements. The Bureau of Land Management takes no position in regard to this material.



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## CHAPTER 1

### DESCRIPTION OF THE PROPOSED ACTION

#### PURPOSE

The United States Air Force has been using the Luke Air Force Range (LAFR) in southern Arizona as a weapons delivery training complex since 1941 and needs to continue using the land to assure that military aircrews are combat ready. LAFR consists of 2,669,225 acres, 2,609,694 acres of which are withdrawn public land and 59,531 acres of which are leased and fee owned. Figure 1-1 shows the location of LAFR.

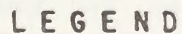
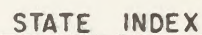
The public lands on LAFR have been withdrawn under various public laws, executive orders, and public land orders. Withdrawal of 502,792 acres of public land on LAFR has expired, and the Air Force has applied for renewal to provide adequate lands for continued military aircrew training. The withdrawal status of the remaining 2,106,902 acres of public land is under review by the Department of the Interior (DOI) and the Air Force.\* Table 1-1 provides a review of LAFR acreage.

The proposed withdrawal is undertaken in accordance with the Engle Act of 1958 (PL 85-337) and the Federal Land Policy and Management Act of 1976 (PL 94-579). The proposed withdrawal is for 20 years with a renewal option for two additional 10-year periods. The correct legal description of the land to be withdrawn may be obtained from the Environmental Engineers, 58th Civil Engineering Squadron, Luke Air Force Base.

The LAFR training complex is designed to provide aircrew practice and training and evaluation of new weapons and tactics necessary to develop skills for national defense. The land areas provide air-to-ground target training for bomb, rocket, strafe, and simulated nuclear weapons delivery under controlled training conditions. Airspace over the range provides an air-to-air gunnery practice area, which allows aircrews to intercept towed targets and to fire inert rockets, missiles, and ammunition.

---

\*This withdrawal is by virtue of an October 27, 1952 letter from the Secretary of the Interior to the Secretary of the Air Force, which granted the Air Force permission to continue use of the lands pending issuance of a formal public land order granting an indefinite withdrawal. Although the contemplated public land order was never issued, in effect the October 27 letter became a constructive public land order granting the Air Force an indefinite withdrawal. The National Emergencies Act (PL 94-412) has no application to the lands referenced in the 1952 letter, as the World War II national emergency giving the military jurisdiction over the Luke Air Force Range ended before the issuance of the October 27 letter.



- |                                                                                     |                           |
|-------------------------------------------------------------------------------------|---------------------------|
|  | International Boundaries  |
|  | County Boundaries         |
|  | Interstate Highway Marker |
|  | U.S. Highway Marker       |
|  | State Highway Marker      |

2

TABLE 1-1  
ACREAGE SUMMARY FOR LUKE AIR FORCE RANGE

|                                                                                           |               |
|-------------------------------------------------------------------------------------------|---------------|
| Acres under PL 87-597 proposed for continued withdrawal                                   | 485,661       |
| Acres proposed for new withdrawal (formerly under BLM use permit)                         | <u>17,131</u> |
| Total acres of proposed withdrawal                                                        | 502,792       |
| Total acres under existing withdrawal (including 1885 acres withdrawn for Gila Bend AFAF) | 2,106,902     |
| Total leased/fee owned land (some leased land within withdrawn area)                      | <u>59,531</u> |
| Total acreage composing <u>LAFR</u>                                                       | 2,669,225     |

This document will cover military operations on the entire LAFR to provide the decisionmaker and public a review of how the acreage is used, an understanding of the need to segregate the entire range for continued military use, and an analysis of the environmental consequences of such a decision.

#### LOCATION AND HISTORY

A wedge-shaped area extending east-west between the communities of Ajo and Yuma, Luke Air Force Range (LAFR) lies in southern Yuma and Maricopa Counties and in western Pima County in southwestern Arizona (figure 1-1). The Gila River Valley, Interstate Highway 8, and a mainline of the Southern Pacific Railroad nearly parallel the northern boundary, and the United States-Mexico border defines the southern boundary. Organ Pipe Cactus National Monument and the Papago Indian Reservation form part of the eastern boundary, and the Yuma Marine Corps Air Station lies at the western boundary. LAFR includes 825,440 acres managed by the US Fish and Wildlife Service (FWS), including 96 percent of the 860,000 acres in the Cabeza Prieta National Wildlife Refuge (NWR). This refuge was established in 1939 by Executive Order 8038.

A major factor in selecting the site for Luke Field in 1941 was its location in a vast, undeveloped desert on public lands. Its value as a bombing and gunnery range was noted by Lieutenant Colonel Ennis C. Whitehead, who was dispatched by the War Department in February 1941 to select a site and begin preparations for an advanced flying training base west of Phoenix. The base was first known as Litchfield Park Air Base, but was renamed Luke Field on 6 June 1941.

On 24 March 1941, construction on the air base began. Lt. Col. Whitehead began preparations for obtaining use of the public lands as a training range in May 1941. On 5 September 1941, President Franklin D. Roosevelt issued Executive Order 8892, withdrawing 1,077,500 acres of Federal land from public use, creating an aerial bombing and gunnery range.

Following World War II and the Korean conflict, a series of land withdrawals enlarged the range area for military use. Table 1-2 provides a chronological listing of the executive orders (EOs), Department of the Interior Public Land Orders (PLOs), Public Laws (PLs), and Department of the Interior (DOI) correspondence governing the withdrawals for LAFR.

Several other laws and executive actions later changed these withdrawal orders. Near the end of World War II, EO 9526, dated 28 February 1945, proclaimed that the range would return to DOI jurisdiction 6 months following the end of the unlimited national emergency declared in May 1941.

In Proclamation 2974, April 28, 1952, DOI notified the Secretary of the Air Force that pending issuance of a PLO by DOI, the Air Force could continue to use the land under withdrawal. DOI has yet to issue the PLO covering the 2,106,902 acres of land withdrawn before 1952.

These land withdrawals parallel the development of Luke AFB, and its growing need for bombing the gunnery land. During the World War II the range complex consisted of an adequate ground gunnery layout and five aerial ranges. In the spring of 1942 the desert around the town of Gila Bend, Arizona was designated as a location for a small base, and a site was selected a few miles southwest of the town. A detachment of Luke Field personnel set up a tent site on 8 June 1942, and construction of the base began.

Jurisdiction of Gila Bend Army Air Field fluctuated between Luke Field and Williams Field throughout the 1940s. Gila Bend Field was deactivated in 1946 as was Luke Field.

Luke Field was reactivated on 1 February 1951 as Luke Air Force Base. During its inactivation, small detachments remained at Luke to service aircraft from bases continuing to use the bombing and gunnery range. Shortly after reactivation, negotiations began to transfer control of the range complex from Williams AFB to Luke AFB.

On 12 March 1951, 36 airmen and one officer were assigned to Gila Bend Field to reactivate the facility. Control of the range was returned to Luke AFB effective 1 September 1951. The official name of the range, however, remained the Williams Bombing and Gunnery Range.

TABLE 1-2  
LAND WITHDRAWALS SUPPORTING LUKE AIR FORCE RANGE

| Order/Law               | Year | Acreage   | Remarks                                                                          |
|-------------------------|------|-----------|----------------------------------------------------------------------------------|
| EO 8038                 | 1939 | 860,000   | Established Cabeza Prieta NWR                                                    |
| EO 8892                 | 1941 | 1,077,500 | Established range                                                                |
| EO 9104                 | 1942 | 43,895    | Expanded range                                                                   |
| PLO 56                  | 1942 | 885,702   | Expanded range                                                                   |
| PLO 97                  | 1943 | 97,920    | Expanded range                                                                   |
| PLO 512                 | 1948 | -(43,895) | Revoked EO 9104                                                                  |
| PLO 652                 | 1950 | 45,140    | Reinstated land previously under EO 9104 and added 1245 acres for Gila Bend AFAF |
| EO 9215                 | 1952 | 640       | Added to Gila Bend AFAF                                                          |
| DOI letter              | 1952 | 2,106,902 | Letter granted indefinite extension of existing withdrawals                      |
| Special land use permit | 1953 | 17,131    | Continually renewed through 1978                                                 |
| PL 87-597               | 1962 | 140,570   | Expanded range                                                                   |
| PL 87-597               | 1962 | 345,091   | Expanded range                                                                   |
| PLO 5324                | 1973 | 485,661   | Extended PL 87-597 to 1977                                                       |

## PROCEDURES

Activity in the 1950s and 1960s centered on expanding and modernizing the facilities within the range complex and obtaining withdrawn land from private and State lessors.

After full-fledged advanced fighter training resumed at Luke AFB in 1951, physical changes within the range facilities primarily involved technical advances in tactics, target facilities, and aircraft. The complex consisted of six air-to-ground ranges, three tactical ranges and one air-to-air range, primarily involving airspace. Ranges were closed, reopened, and revised as conditions dictated. As the arrival of jet fighters dictated changes from the World War II type ranges, so did the arrival of such aircraft as the F-100, which replaced the F-84. Other advancements saw the F-4 replace the F-100 and A-7; the addition of the F-5 and F-104 for foreign pilot training; and the arrival of the F-15 in November 1974. On 6 March 1963 the name of the range was officially redesignated the Luke Air Force Range (LAFR).

Through the years executive and public land orders for withdrawal of the lands have changed only slightly. Figure 1-3 outlines the major portions of public land withdrawn for LAFR use. The expiration of withdrawal under PL 87-597 and PLO 5324 and the expiration of the special land use permit requires that the Air Force apply for a renewal of land withdrawal covering areas A, B and C (see figure 1-2).

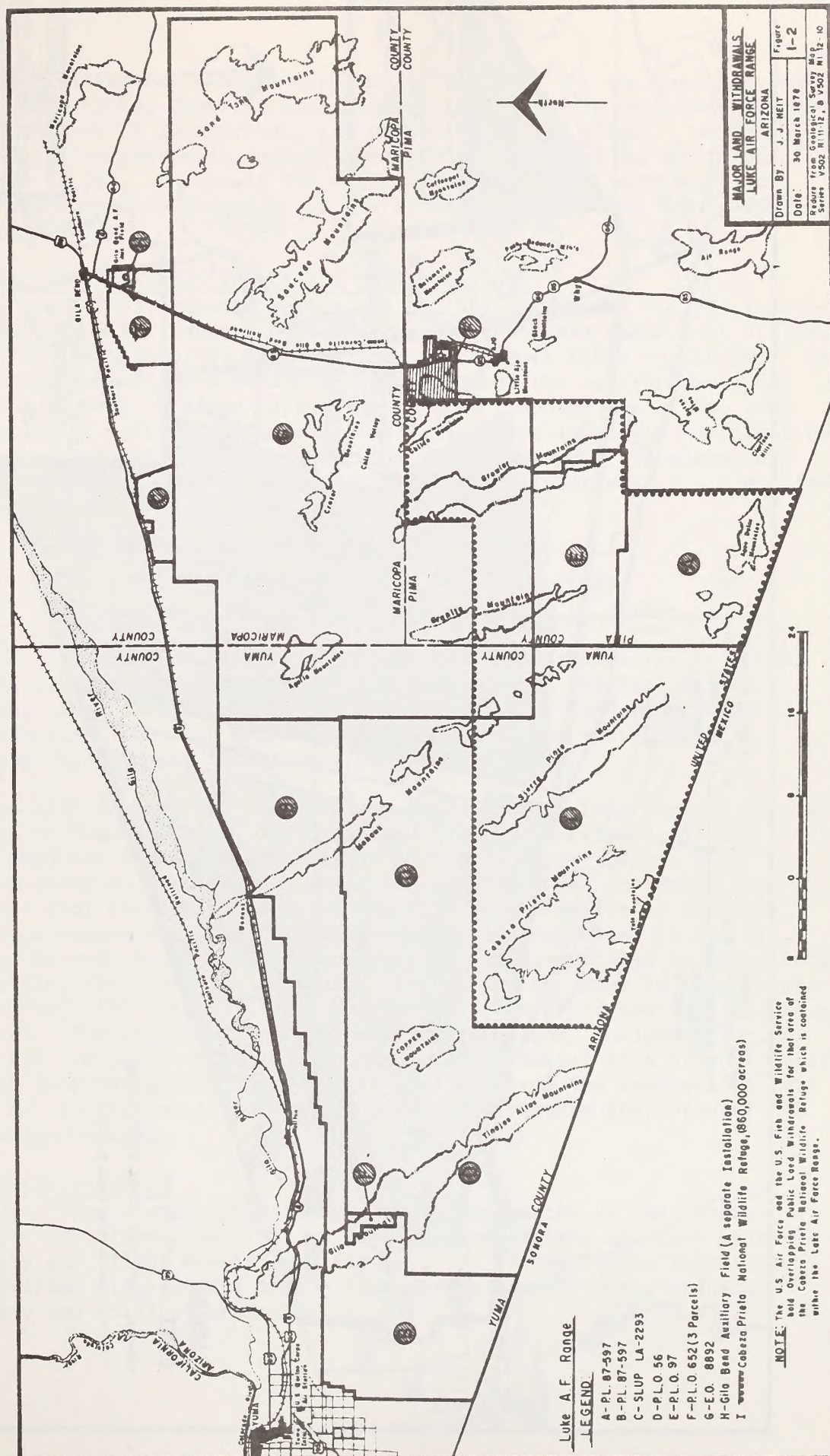
## PROCEDURES

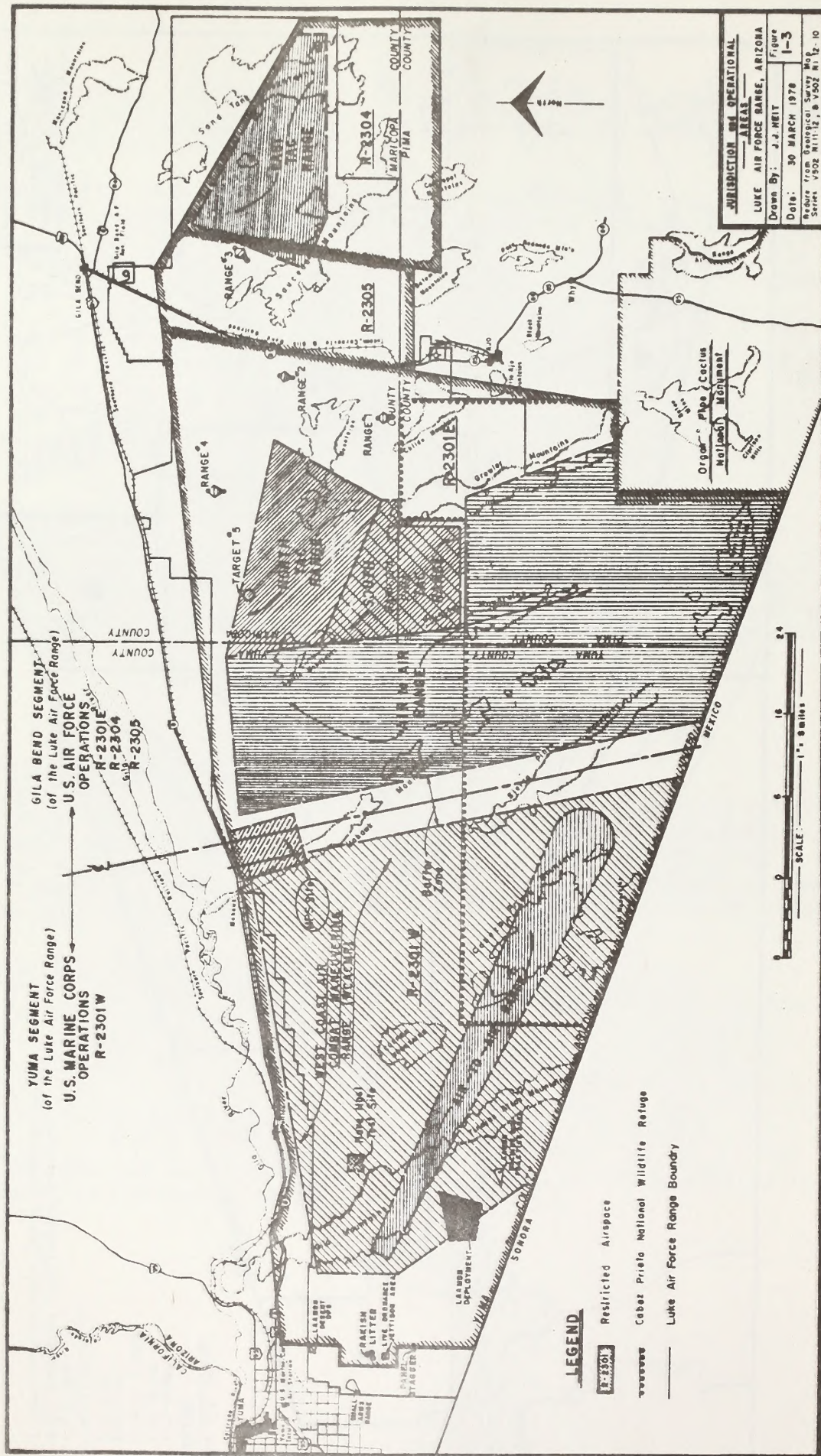
### ENGLE ACT CONSIDERATIONS

Passage of the Engle Act in 1958 (PL 85-337) shifted responsibility for defense-related withdrawals from the executive branch of government to Congress. The main feature of the Engle Act requires congressional legislation for withdrawals exceeding 5,000 acres. Withdrawals of less than 5,000 acres will continue to be made by the executive branch through public land orders.

### FEDERAL LAND POLICY AND MANAGEMENT ACT CONSIDERATIONS

The Federal Land and Policy Management Act (FLPMA) (PL 94-579) provides procedures for withdrawal of land by the Secretary of the Interior. FLPMA established new procedures for executing land withdrawals for lands not under DOD jurisdiction and established a segregative period of 2 years, allowing the Secretary of the Interior adequate time to evaluate and process the application for withdrawal. FLPMA also requires the Secretary to review existing withdrawals to determine whether and for how long they are consistent with the objectives of programs for which the lands were dedicated as well as other programs.





The major difference between application of FLPMA and the Engle Act is that, under FLPMA, Congress must act to disapprove the proposed withdrawal. In the absence of disapproval, the withdrawal takes effect. Under the Engle Act, Congress must approve the withdrawal giving jurisdiction of the land to DOD. Proposals for withdrawals under both acts must be considered by the Secretaries of the Interior and Defense before submittal to Congress.

#### NATIONAL ENVIRONMENTAL POLICY ACT CONSIDERATIONS

The National Environmental Policy Act of 1969 (NEPA) (PL 91-190) insures that environmental impacts be addressed for continued withdrawal of land for LAFR. Additionally, NEPA requirements support FLMPA requirements in that Congress must be provided documentation of the environmental and economic impacts, a clear explanation of the proposed use of the land, evaluation of natural resources, possible alternatives, and consultation with other Federal agencies concerning the withdrawal. To adequately address the environmental impacts of the range withdrawal, the operation of the entire LAFR is addressed.

### EXISTING OPERATIONS AND SITE CONDITIONS

#### OPERATIONAL RESPONSIBILITY

Tactical Training Luke (TTL) is the command organization for both Luke AFB and LAFR. It functions under the Commander of the Tactical Air Command. Subordinate units of TTL responsible for conducting LAFR operations are the 58th Tactical Training Wing, the 405th Tactical Training Wing and the 58th Combat Support Group.

LAFR is divided into two parts--the eastern or Gila Bend Segment and the western or Yuma Segment. The Gila Bend Segment contains 1,651,235 acres, and the Yuma Segment contains 1,017,990 acres (figure 1-3). Under a joint use agreement between the Air Force and the Navy, the airspace over the Yuma Segment of the LAFR is controlled by the Navy, and the airspace over the Gila Bend Segment is controlled by the Air Force. Ground access to these segments is also controlled by the agency controlling the overlying airspace. Control by the Navy is through the Marine Corps Air Station, Yuma (Yuma MCAS). Air Force control is through Luke AFB. The construction of ground installations, including roads, buildings, targets, wells, towers, and ordnance burial pits at any location on LAFR (excluding the Cabeza Prieta NWR) requires the approval of Luke AFB. All activities in the Cabeza Prieta NWR require the approval of the refuge manager.

#### RESTRICTED AIRSPACE

LAFR uses four restricted airspace areas, designated by the Federal Aviation Administration (FAA) to provide airspace for military ordnance delivery and flight operations (figure 1-3). Nonparticipating military and civilian aircraft are banned from this airspace during ordnance delivery and military training.

#### USERS OF THE RANGE

Air Force, Marine, and Navy units use LAFR to simulate combat and provide aircrew training to develop and maintain combat proficiency and skills. The primary Air Force units include the 58th and 405th Tactical Training Wings, Luke AFB, Arizona; the 355th Tactical Fighter Wing, David-Monthan AFB, Arizona; the 474th Tactical Fighter Wing and the 57th Fighter Weapons Wing, both located at Nellis AFB, Nevada; the 27th Tactical Fighter Wing, Cannon AFB, New Mexico; the 49th Tactical Fighter Wing, Holloman AFB, New Mexico; the 162nd Tactical Fighter Training Group (Air National Guard) Tucson International Airport, Tucson, Arizona; 302nd Special Operations Squadron (AFRES), Luke AFB, Arizona; the 35th Tactical Fighter Wing, George AFB, California; the 425th Tactical Fighter Training Squadron, Williams AFB Arizona; plus Air National Guard and Air Force Reserve units from Arizona and other States.

Marine Corps/Navy units include those based at Miramar Naval Air Station and North Island Naval Air Station, San Diego, California; El Toro USMC Air Station, Santa Ana, California; Camp Pendleton, California; Yuma USMC Air Station, Yuma, Arizona; as well as units located throughout the continental United States, Hawaii, and the Atlantic and Pacific Fleets.

#### TYPICAL FLIGHT OPERATIONS

Aircraft depart the various military bases and proceed by FAA regulations to the LAFR. Enroute training may include low-altitude visual and radar navigation over FAA-coordinated routes and target ingress tactics. A typical flying mission lasts 1 to 2 hours with 30-40 minutes of that time devoted to weapons delivery training. All range activities are closely controlled by centralized scheduling officers at Luke AFB and Yuma MCAS. Typical training operations conducted on the range include strafing; air-to-surface rocketing and bombing; air-to-air gunnery, missile, and intercept training; surface-to-air missile firing, air combat maneuvering and tactics; navigation and functional flight checks; search and rescue; and operational testing and evaluations.

#### RANGE TARGETS

LAFR is divided into 13 separate aerial weapons ranges or target complexes. Four of these ranges are in the Yuma Segment under the operational control of the Yuma MCAS. They are Rakish Litter and Panel Stager (both manned air-to-ground ranges); an air-to-air gunnery range; and an air combat maneuvering range (ACMR). The remaining nine range and target complexes are within the Gila Bend Segment and are under the operational control of Luke AFB. These ranges include manned ranges 1 through 4, unmanned target 5, three tactical (TAC) ranges and an air-to-air gunnery range.

#### MANNED AIR FORCE RANGES

Expenditures on the four manned ranges of the Gila Bend Segment are limited to training type (inert) ordnance. Inert ordnance are of the same size, weight, and shape of live ordnance but contain only an explosive spotting charge to signal the aircrew on the accuracy of the

drop. The spotting charges range in size from that of a shotgun shell up to about 10 pounds of black powder. The approximate impact areas on a typical range are shown in figure 1-4.

a. Ranges 1 through 4: These manned ranges consist of a composite simulated nuclear and conventional weapons delivery targets. Ranges 1 and 2 are used only during daylight, whereas Range 3 and 4 have a 24-hour capability. See figure 1-3 for general location.

#### UNMANNED AIR FORCE RANGES

With the exception of targets 16 (North TAC) and 311 (East TAC), inert ordnance is expended against the unmanned targets of the Gila Bend Segment. These ordnance include BDU-33, MK-106, 20/30 mm ball ammo, 2.75/5-inch inert rockets, inert general purpose bombs (500 pound), inert fire bombs (100 pound), and BDU 8/12 shapes.

Live ordnance expended against targets 16 and 311 includes 500-pound general purpose bombs, 100-pound fire bombs, and 30-mm high explosive ammunition.

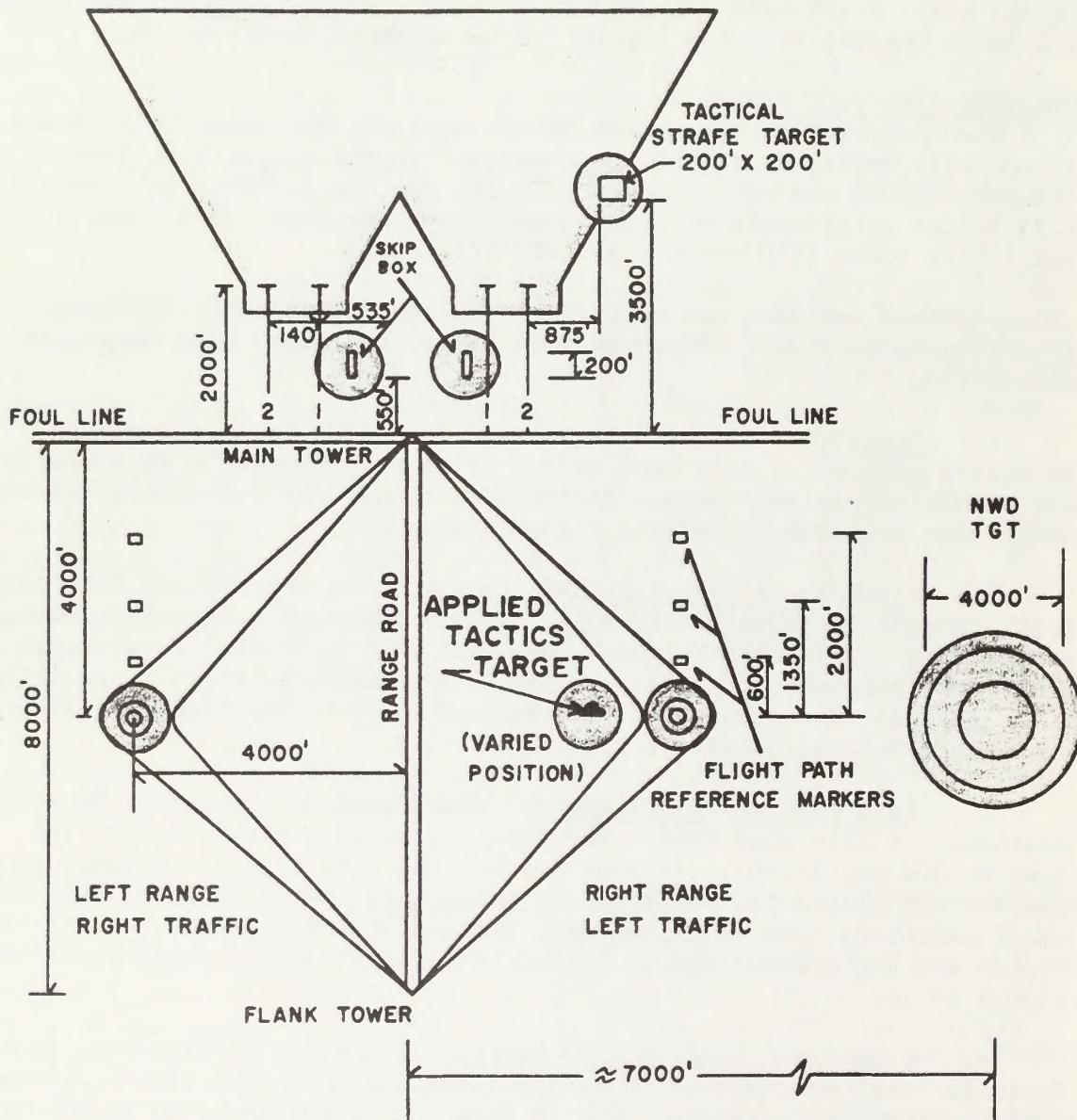
a. Target 5: Target 5 is located in R-2301 East approximately 31 NM west-southwest of Gila Bend AFAF. It is used primarily as a target for simulated nuclear weapons delivery at the end of a visual or radar navigation training route (see figure 1-3).

b. North/South Tactical (TAC) Ranges: The North/South Tactical Range complex includes a variety of targets designed to simulate combat situations. The North Tactical Range (NTACR) is located 26 nautical miles (NM) southwest of Gila Bend AFAF. The South Tactical Range (STACR) is located 35 NM southwest of Gila Bend AFAF. Both the NTACR and STACR are within Restricted Area R-2301 East.

c. East Tactical (TAC) Range: This range is located 12 NM south southeast of Gila Bend AFAF. The ETACR is located within Restricted Area R-2304 and R-2305. It provides for the same type of training as the N/STACR listed in the preceding paragraph. Manned Range 3 and the ETACR cannot be used simultaneously because of the closeness of the two ranges and the probability of conflicting flight traffic patterns (see figure 1-3).

d. Electronic Warfare (EW) Range: This range overlies the East Tactical Range and is used in conjunction with scheduled ground attack tactical training missions. The EW Range provides simulated enemy air defenses for tactical units conducting strike and strike-related operations. A variety of simulated antiaircraft artillery, surface-to-air missiles, and jamming systems are deployed near the East TAC range for units to employ Electronic Counter Measures (ECM), Chaff, and Radar Warning Receiver (RWR) equipment tactics and techniques. The radar threat environment is generated from Gila Bend AFAF and from field sites within the area.

# MANNED RANGE TYPICAL IMPACT AREAS



- NOTES:**
1. IMPACT AREAS ARE SHADED.
  2. ALL CIRCLES 600' IN DIAMETER EXCEPT NUCLEAR WEAPONS DELIVERY (NWD) TARGET.

FIGURE 1-4

e. Air-to-Air Range: This range (none are manned) is used for various types of air-to-air gunnery and missile training, mainly air-to-air dart firing. The northernmost portion of the area (Growler-Child Valley) is designated for a rendezvous area for aircraft and for dart target launching. The actual firing operation is conducted south of the rendezvous area. A major portion of the Cabeza Prieta NWR underlines the Air-to-Air Range, and flight/firing operations are permitted over this area by a 24 March 1975 memorandum of understanding among the departments of the Air Force, the Navy, and the Interior. Firing operations are permitted as low as 5,000 feet above ground level (AGL), and overflight is permitted as low as 1,500 feet AGL over the refuge.

f. Air Combat Maneuvering (ACM) High Area: The ACM area is that block of airspace in R-2301 East (figure 1-3) between the surface and 80,000 feet AGL, except over the Cabeza Prieta NWR, where the minimum altitude is 1,500 feet AGL, and over both the North Tactical Range and within 35 NM of the Gila Bend Municipal Airport, where the minimum altitude is 18,000 feet above mean sea level. This area is used for air-to-air tactical maneuver training for aircrews but cannot be used during dart training.

#### NAVY/MARINE CORPS RANGES

Under the operational control of the Yuma MCAS, the Yuma Segment of LAFR contains 4 of LAFR's 13 range and target complexes.

a. Rakish Litter Target Complex: Located in the western portion of R-2301 West, this complex consists of three air-to-ground rocket, bombing, and strafing targets. The north and south targets consist of 20-foot diameter bull's-eyes used mainly for conventional rocket delivery and bombing. The east target is used primarily for noninstrumented loft (or toss) bombing, laydown bombing, and practice napalm deliveries. The east target consists of a 20-foot diameter bull's-eye. This range has four 12-by 8-foot strafing targets. Only inert ordnance (up to and including 5-inch rockets and 100-pound bombs) may be delivered. Also included within the Rakish Litter target complex is a tow banner pattern for dropping target banners. A live ordnance jettison area just outside the target complex is used for dropping live ordnance from aircraft undergoing emergency malfunctions. On an average, 10,000 pounds of ordnance are jettisoned annually.

An explosive ordnance disposal (EOD) decontamination site has also been operating in this area for the past 30 years, during which extensive weapons delivery training has been conducted. Large amounts and types of ordnance thus remain on the range complex. EOD work is conducted regularly and frequently (see figure 1-3).

b. Panel Stager Target Complex: In the western portion of R-2301, this complex includes a loft target and a conventional target. A fully instrumented special weapons and conventional air-to-ground rocket and bombing range consists of a 50-foot diameter bull's-eye for conventional ordnance delivery. Both targets can provide complete profile data, including surface winds and temperatures, altitude, and airspeed. Two strafing targets are also located at the complex (see figure 1-3).

c. Air-to-Air Gunnery Range: This range is located in the central portion of R-2301 West. Air-to-air gunnery and rocket firing is conducted above FL 180--approximately 18,000 feet above mean sea level (MSL). Missiles are fired along a 085 degree magnetic track from over the Panel Stager Target Complex between 15 and 42 NM from Panel Stager (see figure 1-3).

d. Light Antiaircraft Missile Battalion (LAAMBn) Deployment Site: The 2nd Light Antiaircraft Missile Battalion (LAAMBn) conducts a maximum of three live firing exercises a year. During these exercises from four to nine improved Hawk surface-to-air missiles (about 12 feet long and containing high explosives) are fired at target drones. Each exercise is scheduled for 10 days, and the missile's range requires the use of the entire R-2301 area of the LAFR during firing.

In the event of a miss or in-flight malfunction, the missiles are destroyed while airborne, and missile fragments fall to the ground within the LAFR. Missile flight patterns are programmed to avoid flying over the Cabeza Prieta NWR and to prevent missile debris from falling into this area.

In conjunction with the live missile firing, a helicopter operation is conducted, providing needed training in the movement of men and materials. The helilift operation is normally culminated by a live fire machine gun exercise using 30 and 50 caliber guns against simulated enemy ground positions. Approximately 30,000 rounds of ammunition are expended during each of these exercises. The 2nd LAAMBn is only one of two active antiaircraft units in the Marine Corps (see figure 1-3).

e. West Coast Air Combat Maneuvering Range (WCACMR): The WCACMR is in the Yuma Segment, in a portion of R-2301W bounded by the Gila Mountains on the west, the Mohawk Mountains on the east, Interstate 8 on the north, and the Mexican border on the south. Aircraft using the WCACMR must be equipped with special instrumentation to be tracked by the ACMR system. Flight and weapons information is transmitted from the aircraft to ground facilities, where they are processed for real-time display and recorded for aircrew debriefing. Up to 16 aircraft can be tracked on the WCACMR.

The tracking and display capabilities enable the range training officer (RTO) supporting the exercise to follow the aircraft maneuvers in real time on a graphics display and to monitor significant parameters and mission data. UHF communications capabilities built into the system permit the RTO to transmit essential flight information, mission results, and advisory data to the aircrews. Depending on the training mode, audio tones can be broadcast selectively to show whether a particular aircraft is within the designated weapons envelope boundaries or has scored a kill in a simulated missile firing. These missions expend no ordnance, although much supersonic flight takes place.

RANGE ENTRY AND EXIT ROUTES

Entry and exit routes to LAFR vary, depending upon the range to be used, type of mission, and departure/recovery base. Figure 1-5 shows the most generally used routes. Low-altitude training routes near the Papago Indian Reservation east of the LAFR have previously been described in a draft EIS (U.S. Air Force, 1979).

RANGE USE

Range and airspace use of the LAFR is divided between the Marine Corps/Navy, operating in the Yuma Segment/R-2301W and the Air Force in the Gila Bend Segment/R-2302E/R-2305. The Marine Corps manned targets in the Yuma Segment are programmed to operate from sunrise to 2300 daily, 7 days a week. The West Coast Air Combat Maneuvering Range operates between 0720 and 1500, 5 days a week with the ability to expand to 7 days a week if necessary to meet training requirements. Unmanned tactical ranges can normally be used 12-14 hours a day, 5 days a week, except during closures for explosive ordnance disposal (EOD), target repair, and adverse weather. Night operations increase the use of both manned and tactical ranges. Use of the Air Force segment of LAFR has increased over the last few years due to increased use by units from Luke, Williams, and Davis-Monthan Air Force Bases.

Use data appear in table 1-3. Projected range use appears in table 1-4.

TABLE 1-3  
LAFR RANGE USE SUMMARY 1971-1977

| Fiscal Year | Range Hours<br>Available*       | Range Hours<br>Used | Percent<br>Utilization |
|-------------|---------------------------------|---------------------|------------------------|
| 79          | 18,374                          | 12,117              | 66.0                   |
| 78          | 18,677                          | 11,077              | 59.0                   |
| 77          | 15,124                          | 15,014              | 99.2                   |
| 76          | 15,115                          | 11,408              | 75.5                   |
| 75          | Accurate data are not available |                     |                        |
| 74          | 17,104                          | 11,422              | 66.8                   |
| 73          | 13,515                          | 9,024               | 66.8                   |
| 72          | 14,194                          | 10,696              | 75.4                   |

\*Adjusted for hours lost due to holidays, weather, crash and rescue, maintenance, ordnance disposal, and State hunting programs.

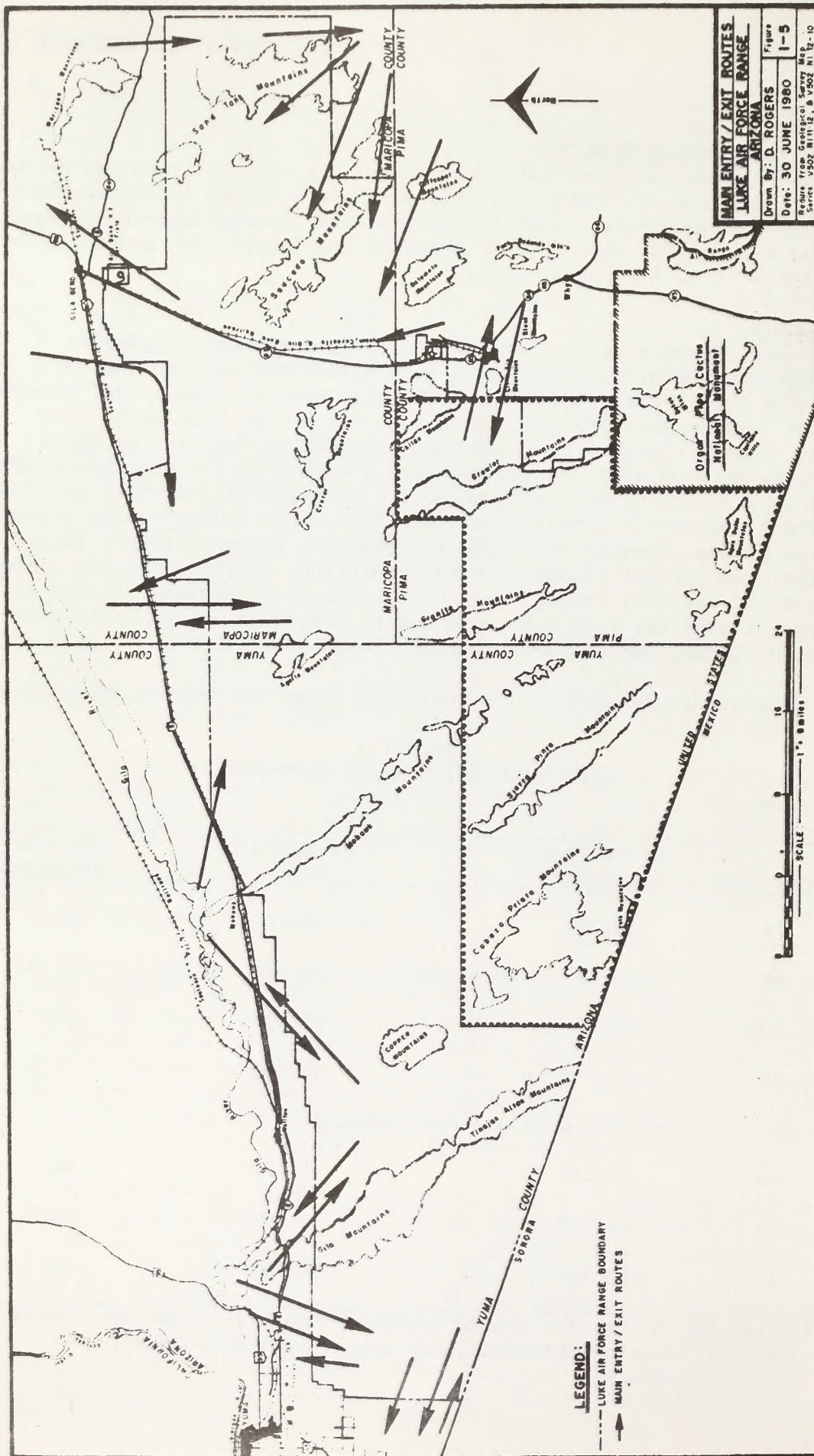


TABLE 1-4  
PROJECTED RANGE USE\*

| <u>Fiscal Year</u> | <u>Projected Hours of Range Use</u> |
|--------------------|-------------------------------------|
| 80                 | 19,134                              |
| 81                 | 19,197                              |
| 82                 | 19,263                              |
| 83                 | 18,344                              |
| 84                 | 16,320**                            |
| 85                 | 15,730**                            |
| 86                 | 16,730**                            |

\*Source: TAC Range Management Plan and Yuma MCAS Fleet Liaison Officer.

\*\*If a new weapon system is added at Luke AFB, the FY 84-86 projected range use would increase by about 2,200 hours per year over these projected values.

#### SUPPORT FACILITIES

Support of the Gila Bend Segment of the LAFR is provided by the Gila Bend Air Force Auxiliary Field (Gila Bend AFAF) (see figure 1-6). The Gila Bend AFAF is a Luke AFB satellite installation operated by the 58th Combat Support Squadron (58 CSS) with mission responsibility to manage, maintain, support, and operate the manned and unmanned ranges encompassing the Gila Bend Segment of the LAFR.

The 58 CSS is responsible for the Gila Bend AFAF facilities, which include a 8,500-foot runway used for mission support and for the emergency recovery of aircraft unable to proceed back to their home bases. Gila Bend AFAF with a base population of about 900 includes the necessary buildings to support the mission.

In addition to the operation and maintenance of the Gila Bend AFAF, support activities include construction, operation, and maintenance of on-range roads, targets, and burial sites. Burial sites are excavations used for burial of either target debris or munitions residue. Burial sites require heavy equipment for excavation and covering, in addition to loaders, trucks, and manpower to retrieve, inspect, handle, and bury the debris and residue. Private contractors recycle metallic debris, reducing the volume of buried materials.

Following initial construction, targets require continual grading and vegetation control and corrective measures for water and wind erosion. Strafe areas require the periodic removal of metal fragments (munitions projectiles) plus discing and mulching to prevent projectile ricochet. Targets must also be repaired and sometimes relocated. New targets are normally constructed to replace those destroyed. Targets are constructed from plywood, wood, 55-gallon drums, railroad crossties, telephone poles, aircraft engine metal shipping containers, and aluminum



dart wings. The Yuma MCAS provides the support for the Yuma Segment of LAFR. Range construction and maintenance is similar to that performed by Gila Bend AFAF personnel.

#### RANGE DECONTAMINATION AND RESIDUE DISPOSAL

Recovery and disposal of munitions residue on the Gila Bend Segment are governed by AFR 50-46 and TAC and Luke AFB supplements to that regulation. Decontamination and cleanup are conducted cyclically, the frequency and area cleared determined by the type of range/target area.

Manned ranges (1-4) are cleared on a monthly, annual, and 5-year basis. Each target on each manned range is cleared of all surface munitions residue and live explosive ordnance to a radius of 500 feet monthly and 2,000 feet annually (4,000 feet on the simulated nuclear weapons delivery targets). The manned ranges also receive a 5 year (EOD) clearance, involving about 7,500 acres in each range.

Air Force tactical ranges are cleared annually and every 5 years. Yearly each target on each range is cleared of all munitions residue and live explosive ordnance on the surface to a radius of 1,000 feet. Every 5 years, explosive ordnance disposal (EOD) clears about 60,000 surface acres each on the three tactical ranges, Panel Stager, and Rakish Litter. Collectively, EOD on manned and unmanned ranges covers 330,000 acres of the LAFR every 5 years. When live explosive exercises are conducted, such as the 21 September 1976 NATO Chiefs Firepower Demonstration, a special clearance operation is exercised immediately after the demonstration to decontaminate and clear the surface of any dud fired explosive ordnance.

Range decontamination involves the removal of explosive ordnance or munitions residue found only on the surface. No attempt is made to locate and remove explosive ordnance that may have buried itself underground upon impact with the surface. The clearance basically consists of 10 to 25 EOD team members and 3 to 20 vehicles covering the contaminated areas in sweep patterns. These teams inspect the area, segregate live from inert ordnance, and destroy the live by detonation or burning. They then place inspected inert munitions residue in a holding area. The items are then reinspected, certified, and released to civilian contractors. Those items not released to civilian contractors for salvage are buried at selected burial sites.

## EXISTING OPERATIONS AND SITE CONDITIONS

Air-to-air firing is conducted in the range airspace, which overlies a portion of the Cabeza Prieta NWR. The center of the dart firing pattern is on the boundary of the NWR, halfway between the Granite and Mohawk Mountains. The dart patterns extend 5-10 miles within the NWR, and more than 50 percent of the 20 mm ball ammo expended will be over the refuge. Live 20 mm ball ammo is jettisoned by some aircraft during air-to-air dart firing. No other undetonated ordnance will result from these operations. No attempt is made to decontaminate or remove residue from the area due to the potential damage to the desert floor.

Munitions disposal involves destroying explosive charges to allow the safe handling and disposal of non-explosive residue. The Air Force Segment of LAFR has two known ordnance disposal areas (figure 1-7). Both have been retired from active use, the most recent on 6 July 1976. The site for a new disposal area has been selected, and a facility will be constructed. This new facility will also serve other government agencies in the Phoenix area.

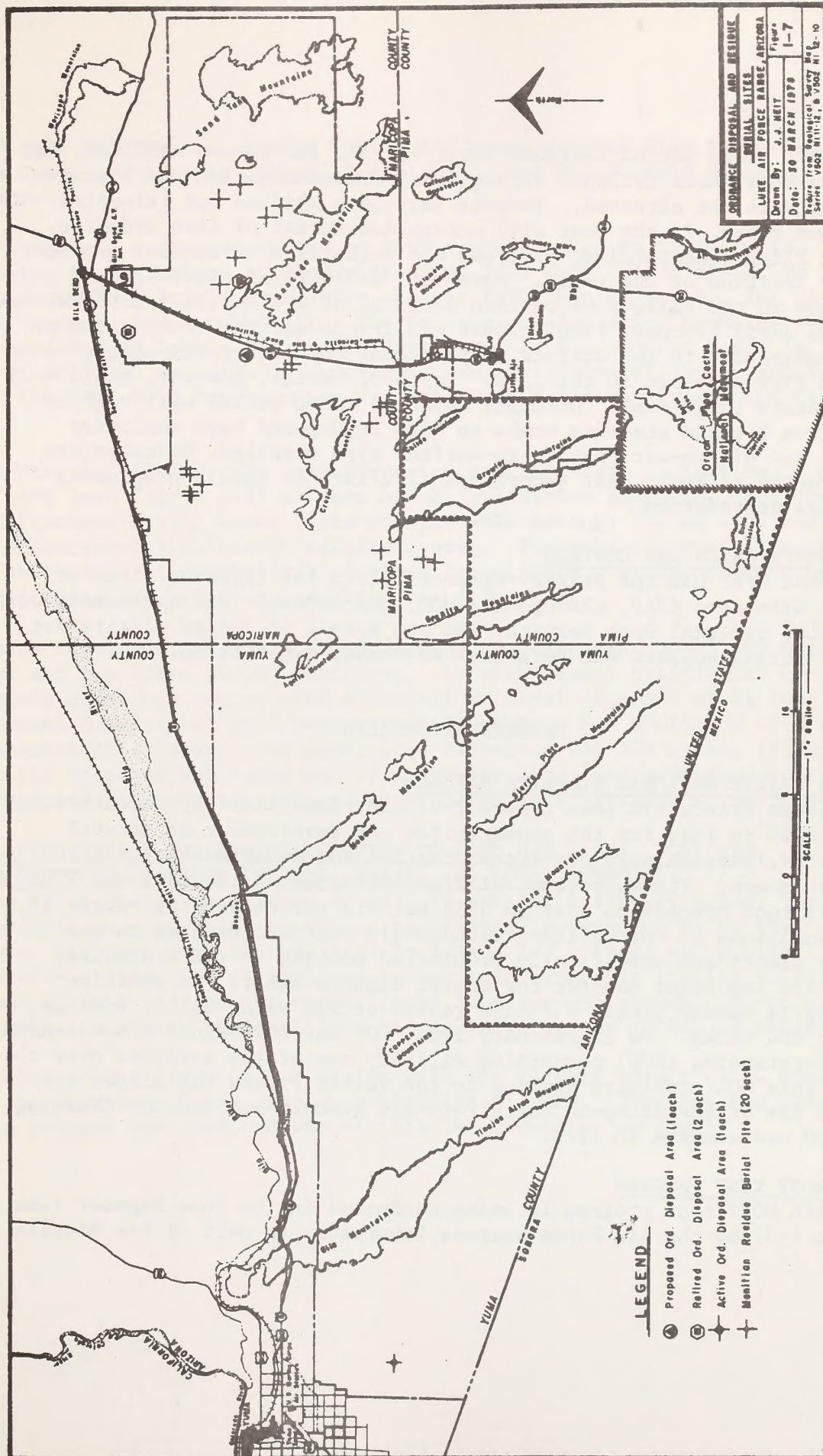
Siting, design, construction, and operations of the new facility are in accordance with appropriate Air Force regulations and technical manuals. No State or local regulations restrict such disposal at the selected site, but the Environmental Protection Agency (EPA) has published (FR Vol 43, No 243, December 1978) proposed rules on hazardous waste, which may restrict the site once the rules are implemented. The final regulations are expected to be issued in 1980. If these regulations are applicable to ordnance disposal operations, the Air Force is committed to compliance.

The Yuma MCAS operates a single disposal area (figure 1-7) in the extreme western portion of the Yuma Segment.

A 10-point small-bore range for the M-16 rifle and 9.38-caliber revolver is located at Gila Bend AFAF. This range is used 3 days every quarter, and 50,000 rounds of ammunition are expended each year. The MCAS Small Arms Range, near the Rakish Litter complex (see figure 1-3), is a 12-point rifle range with a 1,000-yard and 200-, 300-, 500-, and 600-meter firing lines. Facilities include a personnel shelter and a target storage building. The range is in use on the average of 50 weeks per year, 5 days a week. Approximately 400,000 rounds of small arms ammunition are expended on this range each year.

### RANGE CONTAMINATION

Over the last 35 years an enormous variety and quantity of ordnance have been delivered to a host of targets on and in the airspace over



## INTERRELATIONSHIPS

the LAFR. This period includes World War II, the Korean conflict, and the Southeast Asia buildup, during which decontamination and record-keeping were not stressed. Targets have been shifted and relocated numerous times, in the past with unrecorded burial of live ordnance. During flight emergencies, aircrews are authorized to release ordnance at any location on the range. Moreover, delivery of air-to-ground ordnance in the valleys of certain sections of the Cabeza Prieta NWR was allowed until February 1960. These conditions and the restriction of decontamination to the surface only suggest the widespread existence of buried live ordnance on the LAFR. Depth of burial, however, could vary from inches to 20 feet. Ordnance expected to be buried will vary in size from 3-pound practice bombs to MK84 2000-pound high explosive bombs, and air-to-air and air-to-surface type missiles. Ordnance are constructed of heavy cast iron/steel (1/2 inch or more), precluding eventual degradation.

### FIRE SUPPRESSION AND CONTROL

Gila Bend AFAF has the primary responsibility for fighting fires on LAFR. Gila Bend AFAF, through the DOD, has entered into agreements with FWS, BLM, National Park Service, and the Bureau of Indian Affairs for fire-fighting support and personnel to combat range fires.

## INTERRELATIONSHIPS

### CABEZA PRIETA NATIONAL WILDLIFE REFUGE

The Cabeza Prieta NWR (see figure 1-3) was established by Executive Order 8038 in 1939 for the conservation and development of natural resources, particularly for the protection and management of desert bighorn sheep. The subsequent military withdrawals (EO 8892 and PLOs 56 and 97) took precedence over EO 8038 but did not rescind or revoke it. The conditions of the military withdrawals confined bombing to the valley floors and specifically prohibited bombing in the mountains, which are important habitat for desert bighorn sheep. In addition bombing is banned within a 1-mile radius of all water holes, springs, wells, and tanks. On 25 February 1960, DOD and DOI signed a memorandum of understanding (MOU) concerning military use of the airspace over the NWR. This MOU prohibits bombing in the valley floors but allows continued use of the airspace for air-to-air gunnery and tactics training. The MOU was renewed in 1975.

### HAVE HOST TEST PROGRAM

The HAVE HOST test program is being conducted in the Yuma Segment (see figure 1-3) by the Air Force Weapons Laboratory as part of the Missile

"X" (MX) ICBM Weapons System Validation Phase Program Plan supported by the Space and Missile Systems Organization and the Defense Nuclear Agency.

HAVE HOST is a planned series of scaled high-explosive field tests, ranging in equivalent surface yield from 1.25 - 59.0 tons of TNT to validate the multiple protective shelter (MPS) basing concept for cost, performance, and survivability and to develop simulation techniques to be used during future full-scale development. The program began in April 1977 and is still in progress. The environmental impact analysis for the HAVE HOST test program was completed before beginning the tests.

#### MX

The Missile "X" (MX) MPS trench construction and test project was conducted on LAFR (see figure 1-3) as part of the validation phase for development of alternate basing modes (vice present silo basing) for an advanced intercontinental ballistic missile system. The project involved construction of protective structure (PS) sections to validate cost and production projections and rapid construction technology.

The PS construction consisted of digging two trenches, one 1,500 feet long and the other 20,000 feet long. In each trench cylindrical concrete tunnels were constructed with a nominal internal diameter of 13 feet and external diameter of 16.5 feet. Each PS section has a minimum of 5 feet compacted fill cover. The total area disrupted was 200 acres, 183 acres for the trenches and ramps and 17 acres for roads and equipment years. A separate EIS on this project was prepared (U.S. Air Force, no date).

#### RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS OF OTHER FEDERAL, STATE, AND LOCAL AGENCIES

Land in southwestern Arizona is only 10 percent privately owned. The remainder is controlled by either the Federal government or by the State, although some of this land is leased for private and public ventures. This type of nonlocal, nonprivate ownership results in large areas of land outside the normal local land use and zoning contracts. As such the impact of local land use policies on the action is minimal.

Local land use planning and zoning will not directly affect or be affected by continuation of the ongoing activities of LAFR. Planning has taken into account the accepted use of this large expanse of land.

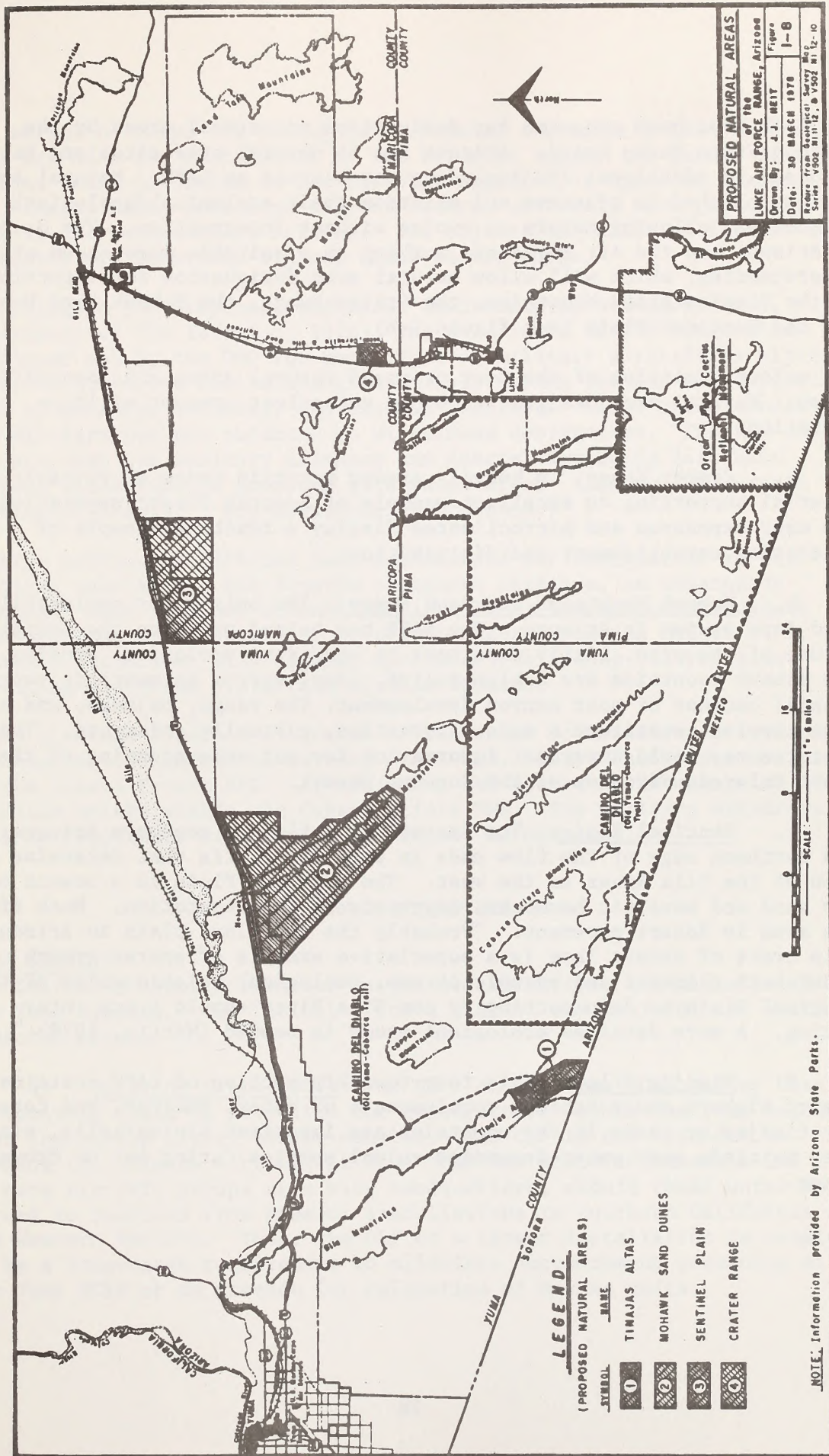
## INTERRELATIONSHIPS

Government lands within the LAFR boundary are managed by several agencies, including BLM, FWS, General Services Administration (GSA), and the State of Arizona. These lands would revert to administrative control of these agencies and to operation of the public land laws should DOD determine that it no longer has a need for the property and relinquish jurisdiction to BLM.

State Trust Lands are parcels of land owned and administered by the Arizona State Land Department. They were deeded to the State of Arizona by the Federal government through the enabling legislation that brought Arizona into the Union. Arizona was given suitable land that it could lease out for such purposes as grazing and prospecting. The State Trust Land on the LAFR has been withdrawn from leasing to the public and is now paid for by DOD. Under the terms of the agreement with the State, authority rests with DOD. Construction costing over \$25,000 is considered permanent and must be approved by the Assistant Secretary of Defense. The only agreement with the State is a type of restoration obligation: if construction decreases the value of the land or limits its natural utility, the Air Force must pay Arizona the amount of money required to restore the land to its normal condition when the lands revert to State ownership.

Six government agencies require motorized access to LAFR to carry out their administrative responsibilities along the international boundary with Mexico: the International Boundary and Water Commission, U.S. Customs Service, U.S. Border Patrol, Drug Enforcement Administration, Department of Agriculture Animal Health Division, and the Arizona Game and Fish Department.

The 17,131 acres of public land used by the military since 1953 under the special land use permit forms part of the BLM's Green Belt Planning Unit (see figure 1-2). The Green Belt consists of land along the Gila River from Buckeye to Yuma, which includes the area C parcel proposed for withdrawal. These lands were classified by action A-1102 under the Classification and Multiple-Use Act for retention in Federal ownership for multiple-use management. This action segregated the lands from appropriation through homesteading, from desert land entry, from sales under Section 2455 of the Revised Statutes, and from State exchange. The lands were left open to all other forms of appropriation, including the mining and mineral leasing laws. If the military withdrawal is granted, it would nullify the Green Belt classification in parcel C and restrict the land from mining and mineral leasing laws. Four areas on



the LAFR have been proposed for designation as natural areas by the Arizona State Parks Board. Arizona has 36 natural area sites and has proposed an additional 79, including the 4 areas on LAFR. Natural areas are established to preserve and maintain their ecological/geological uniqueness, allowing nature to evolve without interruption. The State of Arizona and the Air Force are working on a suitable memorandum of understanding, which will allow natural area designation for a portion of the Tinajas Altas Mountains, the Crater Range, the Mohawk Sand Dunes, and the Sentinel Plain (see figure 1-8).

The unique qualities of the four proposed natural areas are identified below. Natural area designation would not affect present military operations.

a. Crater Range: A heavily eroded mountain range of volcanic material supporting an excellent example of Sonoran Desert vegetation. The many exposures and microclimates display a textbook example of vegetation establishment and distribution.

b. Mohawk Mountains and Sand Dunes: The only major semistabilized sand dune system in Arizona. The LAFR has helped preserve the undisturbed nature of the site, highly important to sand dune ecological studies. The Mohawk Mountains are a high-relief, long, narrow metamorphic range, unusual because of poor canyon development. The range, bajadas, and sand dune complex constitute a unique formation, virtually undamaged. These features may yield important information for our understanding of the lower Colorado division of the Sonoran Desert.

c. Sentinel Plain: The largest lava flow in southern Arizona. The northern edge of the flow ends in basaltic cliffs that determine the flow of the Gila River to the west. The Sentinel Plain is a mosaic of low sand and basaltic hammocks, depressions, and vegetation. Much of the area is desert pavement. "Probably the best lava plain in Arizona, this tract of desert lava is a superlative example of sparse growth under both climatic and edaphic stress. Geological relationships of the Sentinel Plain to down cutting by the Gila River should prove interesting. A more detailed ecological study is needed (Martin, 1979)."

d. Tinajas Atlas: This four-township section of LAFR contains desert bighorn sheep habitat requirements of water, shelter, and forage. The tinajas or tanks in the mountains are important biologically, since they maintain many water-dependent animal species during hot or drought times.

The series of tanks are geologically unusual and spectacularly beautiful. They are also the destination of the historic trail, the Camino Del Diablo, which is listed on the National Register of Historic Places. The Tinajas Altas mountains support several extremely rare plants found only in the southwestern Arizona. The bajadas and alluvial fans of the mountains are important bighorn sheep winter range.

According to the Proposed Wilderness Environmental Statement (U.S. Department of the Interior, 1976), the wilderness action would allow continued use by the DOD for overflight of military aircraft at altitudes of 1,500 to 80,000 feet above ground level during the air-to-air training, such as gunnery, rocketry, and missile practice. Under these conditions, the military has not objected to wilderness designation. FWS has expressed concern over the military ordnance and debris, including lost dart targets littering the proposed wilderness area. (See the Wilderness section of chapter 2 for additional discussion.)

A large portion of LAFR has been recommended for designation as the critical habitat for the Sonoran pronghorn antelope, an endangered species. This area was recommended in 1977 by the Sonoran Pronghorn Recovery Team under Section 7 of the Endangered Species Act of 1973. The military withdrawal will require continued public use restrictions providing continued protection of this species.

AG&FD also has a permit of access to the range to maintain several water catchments it constructed several years ago. These catchments are not on the Cabeza Prieta NWR. In addition, FWS operates and maintains 22 wildlife waters within the Cabeza Prieta NWR. The military withdrawal will be compatible with catchment use and maintenance.

## FUTURE OPERATIONS

### YUMA SEGMENT

The following construction and target modernizations are anticipated for the Yuma Segment. See Table 1-5 for a list of the projects and estimated impacted acres.

a. Outlying Field (OLF): As part of the Yuma MCAS Master Plan, an outlying field is projected for construction within the Yuma Segment near the Rakish Litter target complex. The OLF is not intended to replace the primary airfield at Yuma MCAS but would accommodate one or more aircraft groups or a wing headquarters, should these units be forced to relocate from present installations in southern California or the Western Pacific. Thus, the OLF or a larger installation is considered to be a long-range requirement to alleviate encroachment pressures at the Yuma MCAS or to provide for relocation of Marine units.

## FUTURE OPERATIONS

Enough space exists for a major airfield and supporting facilities. Building the OLF or airfield would require relocating the Rakish Litter and Panel Stager target complexes. Because of the size and tentativeness of the OLF, a separate environmental assessment/statement would be required for this action.

b. Mobile Land Target (MLT): The MLT consists of a remote controlled vehicle like a dune buggy, which drags a target sled across the terrain, 75-100 feet to its rear. It is highly maneuverable, operating at speeds up to 50 miles per hour. It is controlled from a range tower and is normally maneuvered within a distance of 1,000-3,500 yards from the tower. The drawn target sled, consisting of a helicopter skid with canvas across its top, is attacked by aircraft carrying a variety of inert air-to-ground ordnance.

This training device could also accommodate tank, artillery, and other types of ground fire. Two MLTs are in use, and six more are programmed for purchase in fiscal year 1982 (October 1982-September 1983). The two MLT maneuvering areas will be at the Rakish Litter and Panel Stager target complexes. Each MLT area requires a space 500 by 5,000 feet (about 60 acres).

c. Weapons Impact Scoring System (WISS): To attain a more accurate, reliable, and cost-effective scoring system for attack training ranges while reducing manpower, an optical scoring system was developed. The first approach was to replace personnel at the scoring site with a camera. This approach led to the development of WISS electro-optical scoring system, which measures the impact position of the air-to-ground weapons with respect to fixed and moving targets. The target covers a 4,000-foot diameter circle with a concentric 600-foot diameter inner circle.

The impact sensor subsystem consists of four closed-circuit television cameras (in sets of two) at two scoring sites. The cameras are fixed-mounted at surveyed locations and operated by commercial electricity or generator power. The WISS system, however, is being tested to operate by solar energy, which would significantly reduce the cost of installation and eliminate the need for electrical power. A WISS is planned for the Panel Stager and the Rakish Litter complexes.

### GILA BEND SEGMENT

The following construction and target modernizations are planned for the Gila Bend Segment. See table 1-5 for a list of the projects and areas to be impacted.

a. Luke Air Combat Maneuvering Instrumentation System (Luke ACMI):

The Luke ACMI is programmed to be installed in the Gila Bend Segment (R-2301 East) centered 19.5 NM west of Ajo, as shown in figure 1-9. The ACMI will encompass a volume of airspace extending from 5,000 feet altitude to the upper limits of Restricted Area R-2301 East (Flight Level 800 or approximately 80,000 feet). The ACMI system is similar to the Yuma Segment's West Coast Air Combat Maneuvering Range.

The ACMI system would provide a means to improve the training of Air Force fighter pilots in air combat maneuvering (ACM) tactics and techniques. The system provides for real-time monitor and control of aircraft during ACM training and records events for post-mission analysis. The ACMI is unique in that it fires no guns or missiles. It uses computer simulations to evaluate pilot and weapons system performance. Proposed construction to support the Luke ACMI will use approximately 23 acres, including the ACMI telemetry sites and access roads for range upgrade.

b. Range Target Upgrade: Ongoing programs exist to modernize targets and the simulated threat environment to improve training. Simulation of an electronic warfare threat involves ground-based radar transmitters, which emit signals that are jammed by electronic countermeasures. Air-to-ground targets are improved as they are replaced as a part of routine maintenance. The improvement or replacement of unmanned air-to-ground tactical range targets sometimes involves relocation within the existing boundaries of a tactical range. An environmental assessment is always conducted before any action is taken. If the proposed area has not previously received an archaeological survey, it receives one.

c. Television Optical Scoring System (TOSS): An Air Force program identical to WISS. LAFR has four TOSS Camera sites on the east and two on the south TAC. Plans call for additional sites, whose location and number have not been determined.

Future programs will require environmental impact analysis using procedures in NEPA and in DOD directives.

Table 1-5 reveals that future operations would impact some 3,300 acres during the period of this withdrawal. Past operations of target construction, road building, and ordnance deliveries have impacted an estimated 9,500 acres. Collectively, past and proposed future operations would impact 12,800 acres on the range.



TABLE 1-5  
PROPOSED CONSTRUCTION PROJECTS  
AND ESTIMATED ACREAGE IMPACTS

| Project                                              | Acreage       |
|------------------------------------------------------|---------------|
| A. Proposed Projects                                 |               |
| Mobile Land Target (MTL) Operating Area (2 sites)    | 120           |
| Weapons Impact Scoring System (WISS)                 | 2             |
| Air Combat Maneuvering Instrumentation (ACMI) System | 23            |
| Range Target Upgrade                                 | 50            |
| Television Optical Scoring System (TOSS)             | 2             |
| Explosive Ordnance Disposal (EOD) Surveys            | <u>3,100</u>  |
| Sub Total                                            | 3,297         |
| B. Previous Projects                                 |               |
| Targets, roads ordnance deliveries                   | 9,500         |
| Cumulative Total                                     | <u>12,797</u> |



## CHAPTER 2

### DESCRIPTION OF THE EXISTING ENVIRONMENT

Although LAFR includes only a small portion of the vast Sonoran Desert (figure 2-1), it preserves much of that desert's ecological diversity. The 76.4 million acre Sonoran Desert encircles the Gulf of California like a giant horseshoe and covers portions of southeastern California, southern Arizona, and most of the Mexican States of Sonora, Baja California, and Baja California Sur (Shreve and Wiggins, 1964). This arid region contains one of the world's largest inventories of desert flora and fauna and some of North America's most interesting landforms (Thornbury, 1965).

The Sonoran Desert exhibits many of the characteristics common to desert areas: low humidity and rainfall, a high ratio of evaporation to precipitation, and a lack of moisture available to promote growth. This desert also has many unique aspects. The closeness of the Gulf of California, the Pacific Ocean, and the Gulf of Mexico, and the distribution of high mountain barriers in the region, influence the amount, apportionment, and seasonality of rainfall.

Drought and temperature extremes continually place stresses on the Sonoran Desert environment, but periods of relief are frequent enough to permit rich and highly specialized lifeforms to evolve. The result of specialization and adaptation has been the ability of plants and animals to endure environmental stresses and to make the best use of environmental resources, particularly water.

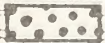
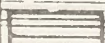
The complexity and diversity of adaptations of species to desert conditions make the Sonoran Desert one of the world's most valuable natural laboratories for the study of desert ecology, the evolution of desert lifeforms, and the physical processes that shape the earth's surface (U.S. Department of the Interior, 1975). LAFR contains some of the most extensive, relatively undisturbed examples of Sonoran Desert remaining in the United States.

### CLIMATE

The climate of LAFR is typical of the Sonoran Desert: arid to semiarid with hot summers, mild winters, relatively low humidity, and infrequent but intense rainfalls.



**LEGEND**

-  GREAT BASIN DESERT
-  MOJAVE DESERT
-  SONORAN DESERT
-  CHIHUAHUAN DESERT

| MAJOR DESERTS of the Southwest                                        |                      |
|-----------------------------------------------------------------------|----------------------|
| Drawn By: J.J. HEIT                                                   | Figure<br><b>2-1</b> |
| Date: 30 MARCH 1978                                                   |                      |
| After Hastings and Turner (1972)<br>Originally Based on Shreve (1942) |                      |

The average daily minimum temperature ranges from 73 degrees to 81 degrees from June through August. The daily highs from mid-May through mid-September generally exceed 100 degrees F from June through August. The daily highs from mid-May through mid-September generally exceed 100 degrees F. Winter high temperatures average between 66 and 71 degrees F (U.S. Air Force, 1967).

In the eastern portion of the LAFR, westerly winds prevail during summer, and easterly winds prevail during the rest of the year. In the western portion southerly winds predominate during the summer, and northerly winds prevail during the rest of the year. (Fugro National, Inc., 1975). Wind speeds average 3 to 5 miles per hour in the eastern portion of the LAFR and 5 to 6 miles per hour in the western portion. Strong winds (50 to 60 miles per hour), which accompany thunderstorms and low pressure storm fronts may pick up dust and sand, creating local dust storms that can reduce visibility to zero.

Precipitation occurs mainly from July through September and from December through February, generally as rain. Some snow flurries occur during January and February. Fifty percent of the annual precipitation occurs in January, July, and August. The remainder is fairly evenly distributed throughout the rest of the year. Summer rains often fall during violent thunderstorms created from Gulf of Mexico or Gulf of California air currents (Green and Sellers, 1964; Hales, 1972). Evaporation (measured at Yuma) averages 120 inches per year (Fugro National, Inc., 1975). Flying weather in the area is excellent, with visibility over 3 miles about 340 days per year.

## AIR QUALITY

### BACKGROUND

Under guidance of the Clean Air Act, the Environmental Protection Agency (EPA) has implemented the national ambient air quality standards. These standards are designed to protect public health (primary standard) and welfare (secondary standard). Additionally, the Clean Air Act requires each State to develop an air quality control program and to issue a State implementation plan defining measures to assure meeting the standards. The States could adopt the Federal standards or develop more stringent standards of their own. (See table 2-1 for Federal and State ambient air quality standards.)

To administer the air quality control program throughout the United States, air quality control regions (AQCR) were established. The LAFR is located within two of these AQCRs. The portion of the LAFR in Pima and Maricopa Counties is in the Phoenix-Tucson Intrastate AQCR, and the Yuma County portion is in the Clark-Mohave Intrastate AQCR.

TABLE 2-1  
AMBIENT AIR QUALITY STANDARDS

| Pollutant                                                                           | National Standards                                                                                                                                                                                                | Arizona Standards |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <u>Carbon Monoxide</u><br>(primary and secondary standards are the same)            | 10 milligrams per cubic meter (9 ppm), maximum 8-hour concentration not to be exceeded more than once a year.                                                                                                     | same              |
|                                                                                     | 40 milligrams per cubic meter (35 ppm), maximum 1-hour concentration not to be exceeded more than once per year.                                                                                                  | same              |
| <u>Nitrogen dioxide</u><br>(primary and secondary standards)                        | 100 micrograms per cubic meter (0.05 ppm), annual arithmetic mean.                                                                                                                                                | same              |
| <u>Hydrocarbons</u><br>(non-methane) (primary and secondary standards are the same) | 160 micrograms per cubic meter (0.24 ppm), maximum 3-hour concentration (6-9 a.m.) not to be exceeded more than once per year. For use as a guide in devising implementation plans to meet the oxidant standards. | same              |
| <u>Particulate matter</u><br>Primary standard                                       | 75 micrograms per cubic meter, annual geometric mean.                                                                                                                                                             | same              |
|                                                                                     | 260 micrograms per cubic meter, maximum 24-hr concentration not to be exceeded more than once per year.                                                                                                           | none              |
| Secondary standard                                                                  | 60 micrograms per cubic meter, annual geometric mean, as a guide to be used in assessing implementation plans to achieve the 24-hour standard.                                                                    | none              |
|                                                                                     | 150 micrograms per cubic meter, maximum 24-hour concentration not to be exceeded more than once per year.                                                                                                         | same              |
| <u>Sulfur dioxide</u><br>Primary standard                                           | 80 micrograms per cubic meter (0.03 ppm), annual arithmetic mean.                                                                                                                                                 | same              |
|                                                                                     | 365 micrograms per cubic meter (0.14 ppm), maximum 24-hour concentration not to be exceeded more than once per year.                                                                                              | same              |
| Secondary standard                                                                  | 1,300 micrograms per cubic meter (0.5 ppm), maximum 3-hour concentration not to be exceeded more than once per year.                                                                                              | same              |
| <u>Ozone</u>                                                                        | 235 micrograms per cubic meter (0.12 ppm), maximum 1-hour concentration not to be exceeded more than once per year.                                                                                               | same              |
| <u>Lead</u>                                                                         | 1.5 micrograms per cubic meter of air averaged over a calendar quarter.                                                                                                                                           | none              |

EPA has reviewed the existing air quality conditions in all AQCRs on a State-by-State, pollutant-by-pollutant basis in relation to attainment of the standards. Although the EPA designation is on a county basis, the trend is to apply nonattainment controls to areas within the counties or urban areas where the standards are exceeded. The nonattainment designation in these counties is established to control stationary new or modified major air pollution sources. No major stationary sources are on LAFR.

The Arizona Bureau of Air Quality Control (1977) has developed a state-wide pollution monitoring network to determine compliance with air quality standards. (See table 2-2 for compliance status of counties in which LAFR is located.) This network consists of monitoring stations maintained by the State, counties, and industry. Most of these stations are in or around towns and cities or industrial plants. A few sites are in rural areas to evaluate background conditions.

The only monitoring sites within 50 miles of LAFR are at Ajo, Yuma, and Organ Pipe Cactus National Monument. The sites at Ajo are maintained by the State and Phelps Dodge Corporation and provide data on particulates and sulfur oxides near the smelter. The State operates a site for carbon monoxide, ozone, and particulates in Yuma and a site at Organ Pipe Cactus National Monument to measure background particulate concentrations. The sites at Ajo and Yuma are influenced by industry and urbanization and thus cannot be used to evaluate ambient conditions on the LAFR. Micro and mesoscale climatic conditions and terrain may limit extrapolating data from Organ Pipe Cactus National Monument.

TABLE 2-2  
AIR QUALITY ATTAINMENT STATUS  
OF PIMA, YUMA, AND MARICOPA COUNTIES

| Pollutant       | Counties    |             |                 |
|-----------------|-------------|-------------|-----------------|
|                 | <u>Pima</u> | <u>Yuma</u> | <u>Maricopa</u> |
| Particulates    | A           | A           | A               |
| Sulfur oxides   | A           | B           | B               |
| Oxidants        | A           | C           | A               |
| Carbon monoxide | A           | C           | A               |
| Nitrogen oxides | C           | C           | C               |

A - Does not meet national standard.

B - Better than national standard.

C - Cannot be classified or is better than national standard.

For its size, climate, physiography, and distance from urbanized areas, LAFR has air quality considered to be below the ambient standards established by EPA and the State, except for the 24-hour suspended particulate standard.

"In a study of diurnal dust variation in the United States, the normally reported visibility of seven miles used by the National Weather Service to indicate the first presence of significant blowing dust, results from an estimated dust concentration of about 2700 ug/m<sup>3</sup> or just over ten times the federal primary 24-hour particulate standard. A day with fifty miles visibility would have 715 ug/m<sup>3</sup> dust in the air on the average, or about three times the federal primary 24-hour particulate standard...Visibility on the LAFR exceeds the seven mile criteria approximately 99.5 percent of the time (Edney, 1960)."

Table 2-3 relates wind speed and particulate concentration to visibility.

TABLE 2-3  
WIND SPEED, DUST, AND VISIBILITY

| Wind Speed (mph) | Dust Loading (ug/m <sup>3</sup> )* | Visibility       |
|------------------|------------------------------------|------------------|
| 1.5-4            | 0.4 - 5                            | unaffected       |
| 4.1-7.5          | 5 - 22                             | unaffected       |
| 7.6-11.5         | 25 - 80                            | unaffected       |
| 11.6-18.4        | 90 - 330                           | some restriction |
| 18.5-24.2        | 350 - 600                          | 90 to 60 miles   |
| 24.3-31.1        | 650 - 1200                         | 50 to 27 miles   |

\*Micrograms/cubic meter

Source: U.S. Air Force, no date.

The average wind speeds are 3 to 5 miles per hour in the eastern portion of LAFR and 5 to 6 miles per hour in the western portion. Applying wind speed data for LAFR to data in table 2-3 reveals that the average dust condition would be 5-22 micrograms/cubic meter (ug/m<sup>3</sup>). Accordingly, days with winds of 12 to 30 miles per hour could produce a high dust

concentration and could exceed the Federal primary 24-hour standard. Percent frequency of occurrence of winds measured at Yuma and Gila Bend indicates speeds of 12 to 30 miles per hour occur 16.2 percent of the time at Yuma and 7.7 percent of the time at Gila Bend. Thus, on the LAFR annual particulate standards would be exceeded, but the 24-hour standard could be exceeded more than once per year. This conclusion is somewhat supported by data collected by the State at Organ Pipe Cactus National Monument during 1977. The annual geometric mean was 33 ug/m<sup>3</sup>. The 24-hour maximum and second highest value recorded were 83 and 78 ug/m<sup>3</sup>, respectively. Both values are well within or below the standards.

#### PRESENT OPERATING CONDITIONS

Two major categories of military operations on LAFR could potentially impact air quality range maintenance (including construction) and aircraft operations. The air quality impact potential of day-to-day maintenance is limited by the relatively low density (activities per unit area) of such activities. Correspondingly, the impact potential of aircraft operations is a function of the aircraft's high operating speed and altitude and local weather.

Since LAFR has no air quality monitoring sites, this EIS reviews two simplified approaches to allow interpretation of existing impacts on air quality from aircraft operations. The first analysis is a simplified box model, in which the annual amount of pollutants is considered to be in a box with a length and width equal to the area of the LAFR and with a height of 3,000 feet. Table 2-4 gives the estimated concentrations for the box-model analysis. This model does not consider factors that would reduce the amount of pollutants with time; it merely takes all of the pollutants for a year's operation and distributes them equally throughout the hypothetical box. Additionally, since half the aircraft operations occur higher than the 3,000-foot ceiling (average mixing height), this model represents a worst-case condition.

The second analysis shown in table 2-4 is an EPA simplistic approach to model area sources on a regional basis. The area model requires estimates of the region's average emission density, the size of the region, and the wind speed through the atmospheric mixing layer. Results of this analysis indicate current operations on the range do not significantly impact the air quality in the region. Construction and maintenance generate some fugitive dust, but the impacts are localized and temporary.

In summation, the air quality over the LAFR appears to meet Federal and State standards with the exception of the 24-hour suspended particulate standard, which could be exceeded during days with high winds.

TABLE 2-4  
DISPERSION ESTIMATES\*  
CALCULATED CONCENTRATIONS

| Pollutant       | Box Model | Area Model | Arizona Standard                                       |
|-----------------|-----------|------------|--------------------------------------------------------|
| Carbon monoxide | 124       | 0.7        | 40,000 - max 1 hr<br>10,000 - max 8 hr                 |
| Nitrogen Oxides | 66        | 0.4        | 100 - annual avg                                       |
| Hydrocarbons    | 17        | 0.1        | 160 - max 3 hr                                         |
| Particulates    | 14        | 0.1        | 75 - annual avg<br>150 - max 24 hr                     |
| Sulfur Oxides   | 11        | 0.1        | 80 - annual avg<br>365 - max 24 hr<br>1,300 - max 3 hr |

\*All data represent micrograms per cubic meter.

#### TOPOGRAPHY AND GEOLOGY

LAFR topography typifies that of the Basin and Range physiographic province of the southwestern United States and northern Mexico. The LAFR lies principally within the Sonoran Desert subprovince, except for Yuma Desert, which lies in the Salton Trough subprovince. The area's primary topographic features include wide, nearly level alluvial valleys and basins separated by abrupt northwest-oriented mountain ranges. The mountains locally known as "sierras," are relatively barren, with veneers of talus and rock debris. Elevations range from 200 feet in the Yuma Desert to 4,084 feet in the Sand Tank Mountains on the eastern boundary of the LAFR. Integrated drainage systems exist, with intermittent through-flow drainage toward the Gila or Colorado River. Locally, drainage may flow southward toward Mexico or internally into small playas (Fugro National, Inc., 1975).

The physiography of the region is controlled by the underlying structure, which it strongly reflects. The major rock types are exposed in the uplifted fault block mountain ranges.

Rock units within the LAFR include crystalline igneous and metamorphic basement rock, competent volcanic and sedimentary bedrock, and volcanic flow rock, which is restricted to geologically young, extrusive igneous (basaltic) rock in association with the basin-fill deposits. The greatest area of exposed basement and sedimentary bedrock occurs in the pediments. Volcanic bedrock and basement units are exposed in the mountains and as isolated outcrops within the basin-fill deposits. Only two areas of volcanic flow rock are exposed in LAFR: the Sentinel Flow and the Pinacates Volcanic Field. Volcanic flow rock probably occurs in the subsurface within the basin-fill.

## SOILS AND WATERSHED

Coarse-grained deposits encompass 98 percent of the basin-fill area occupied by alluvial fans and bajadas, pediments, and stream channels. The average grain-size composition is 30 percent gravel, cobbles, and boulders; 40 percent sand; 25 percent silt; and 5 percent clay. Caliche may be present within these deposits, but the degree of development varies with local conditions (Fugro National, Inc., 1975).

Wind-blown sand, whether in sheet deposits or dunes, consists of uniformly sized, loose dry sand. Small amounts of clay and silt-size particles are also present. These sand deposits constitute 1 percent of the basin-fill area (Fugro National, Inc., 1975).

The fine-grained deposits consist of 90 percent clay and silt-size material; they occur in playas and also constitute 1 percent of the basin-fill area (Fugro National, Inc., 1975).

Desert pavement or lag gravel of gravel to cobble-size material occurs on the surfaces of the older fans and pediments. The youngest fans and bajadas are covered by a discontinuous desert pavement of pea-size gravel. The wind blown sand deposits and playa areas have fairly smooth surfaces, typically composed of finer grained material (Fugro National, Inc., 1975).

Desert varnish, a mineralized patina or coating (hardening of the soil surface caused by exposure to environmental elements), may occur in varying stages of development on the lag gravel. This thin hardened surface layer reduces wind erosion. When the varnish layer is broken, surface soil becomes subject to wind erosion.

Most desert soils are well aerated but high in salts, particularly carbonates, sulfates, calcium chlorides, magnesium, and sodium.

Soil structure, water availability, salinity, and erodibility are major factors determining vegetation type and distribution. Coarser soils, such as those found on upslope area, usually hold more available water of lower salinity than basin soils. Coarser soils also typically support more diverse, less xeric associations of large cacti and paloverde. Permeability of fine-textured soils is low, runoff more rapid, and water availability less (Chamberlin, 1972). On these soils, vegetation canopy tends to be more open and species diversity lower. Caliche in such soils may also further retard infiltration and interfere with vegetation (U.S. Dept. of the Interior, 1975).

## WATER RESOURCES

GROUND WATER

LAFR lies within the lower Colorado Hydrologic Basin and has four major water regions (see table 2-5). In most of the northwest-trending valleys, ground water flows toward the Gila River. In the western portion of the range, flow is toward the Colorado River Valley. In general, depth to ground water decreases with decreasing distance from the river. Ground water in LAFR is also known to occur in basin-fill and perched and rock aquifers. Recharge is supplied mainly by infiltration of surface runoff and direct precipitation. Discharge occurs by pumping, evapotranspiration, and underground flow to the Gila and Colorado River Valleys. A portion of the underflow is believed to flow south across the international boundary into Sonoita, Mexico.

TABLE 2-5  
WATER RESOURCES  
(X-1000 acre-feet)

| Basin                                 | Dependable<br>Supply | Depletion | Storage | Surplus/<br>overdraft |
|---------------------------------------|----------------------|-----------|---------|-----------------------|
| Gila River-Texas<br>Hill-Dome         | 287                  | 287       | 146,000 | 0                     |
| Yuma Area                             | 498                  | 338       | 34,600  | +160                  |
| Gila Bend Area                        | 25                   | 127       | 60,000  | -102                  |
| Gila River-Painted<br>Rock-Texas Hill | 9                    | 86        | 98,000  | - 77                  |

Source: Arizona Water Commission, 1975.

Although the extent and nature of dependable ground water and surface water sources in LAFR and the surrounding area are not fully known, historical evidence (table 2-5) indicates that such sources have diminished. Large amounts of ground water have been withdrawn from alluvial basins, primarily for agriculture. Recent increases in ground water pumping to the north of LAFR to satisfy the accelerating agricultural and domestic demands have reduced the area's ground water level and caused land subsidence.

SURFACE WATER

LAFR has no perennial water bodies, and its supply of surface water is scarce, varying with the seasons. After high-intensity summer rains, surface runoff occurs as overland sheet flooding or occasionally as

flash flooding. Most desert runoff, however, is consumed rapidly by evaporation and infiltration in the alluvial valleys.

Throughout LAFR, natural reservoirs, playas, and drainages catch precipitation and surface runoff. Some waters captured at higher elevations result from snow melt. Catch basins typically retain water for only part of the year. Playas and reservoirs usually fill up after heavy rains but later become depleted from evaporation and seepage through fractured host rock.

LAFR has 41 wildlife water facilities (figure 2-2). The Fish and Wildlife Service (FWS) maintains 22 of these (Dodson, 1979), and the Arizona Game and Fish Department (AG&FD) maintains 19 (Phelps, 1979). These facilities include springs, rock tanks, wells, retention dams, and man-made catchments. State and Federal natural resource specialists have access to the range for maintenance.

Drainages commonly occupy the central portion of a valley or drain large watersheds near the mountains and have numerous secondary tributaries. Although much water flows through these drainage channels, a high percentage of the runoff soaks into the sandy channel beds, leaving little surface water for wildlife.

#### WATER QUALITY

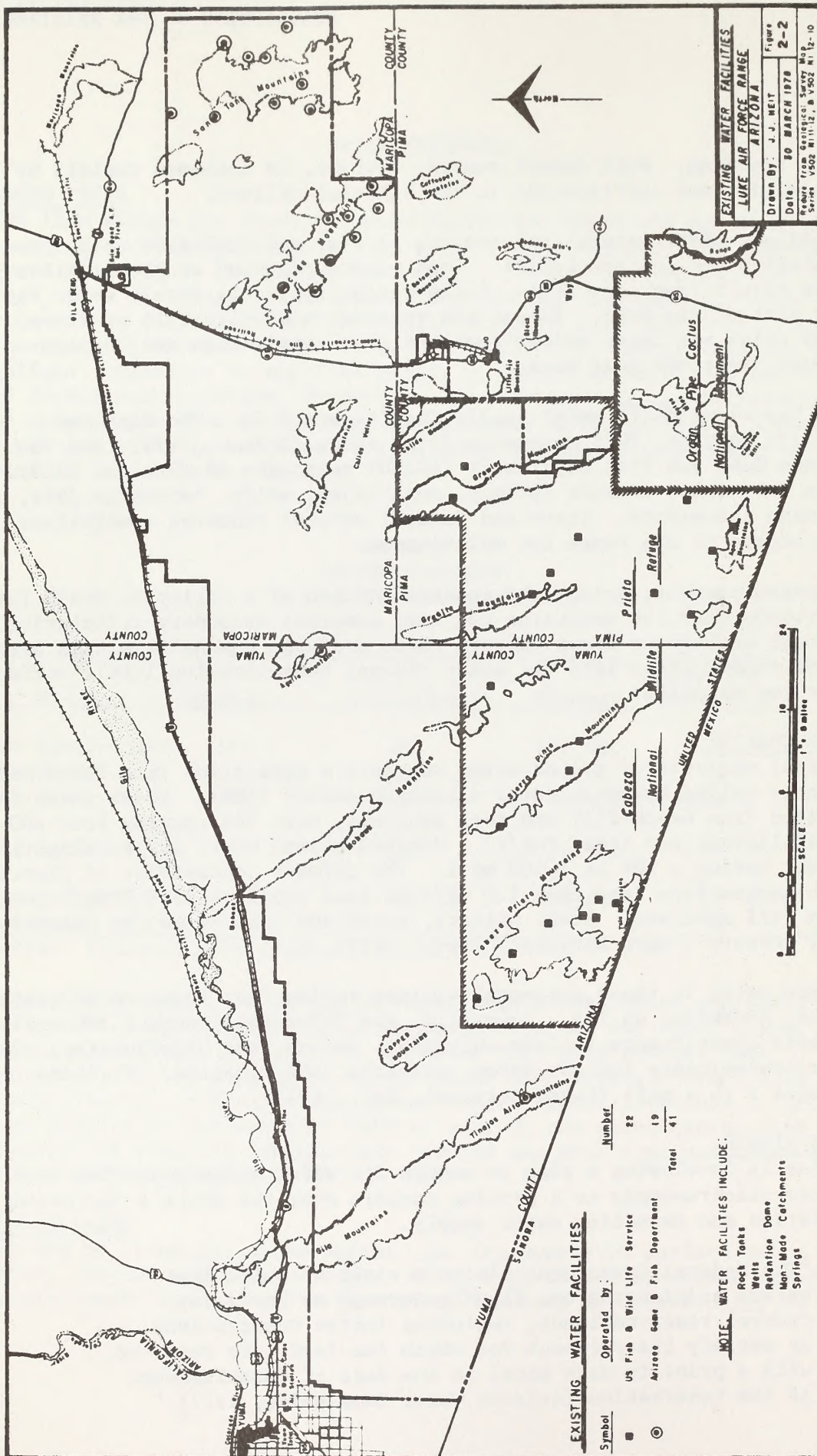
Chemical analysis of ground water suggests a separation into fresh and slightly saline based on total dissolved solids (TDS). Fresh water is obtained from basin-fill and rock aquifers, with TDS ranging from 600 to 850 milligrams per liter (mg/l). Perched ground water may be slightly saline, having a TDS of 1,200 mg/l. The primary contaminant is fluoride, which ranges from less than 1.0 mg/l in rock aquifers to 9.0 mg/l in basin fill aquifers. Iron, nitrate, boron and arsenic may be present in small amounts (Fugro National, Inc., 1975).

Surface water in these ephemeral systems varies from fresh to moderately saline, depending on TDS. Generally, the TDS greatly exceed 500 mg/l. The main constituents include chlorides, sodium, and bicarbonates. The major contaminants include boron, nitrates, and fluoride. Fluoride averages 3 to 4 mg/l (Fugro National, Inc., 1975).

#### WATER RIGHTS

Arizona is developing a plan to manage its water resources. Development of this plan responds to a growing concern over the State's increasing population and dwindling water supply.

"The Federal Government claims a right to sufficient waters originating on, flowing through or bordering federal reserved lands, including Indian reservations, to satisfy the purposes for which the land were reserved, with a priority date equal to the date of establishment of the reservation (Arizona Water Commission, 1977)."



Wells provide the 332,000 gallons of water required daily for the Gila Bend AFAF support facility and for maintenance and construction on the LAFR. Most of this water comes from the Gila Bend and Gila River-Texas Hill-Dome water basins.

#### VEGETATION

The vegetation of any region is closely tied to the region's climate, soils, topography, drainage, and water supply. These determinants and the LAFR's location have combined to produce an unduplicated diversity of species, representing three of the seven vegetal subdivisions or associations of the Sonoran Desert: The Arizona Upland, the Lower Colorado Valley, and the Desert Grassland (U.S. Department of the Interior, 1975).

The Arizona Upland association, found on the upper bajadas and lower flanks of the LAFR mountains, is a Sonoran Desert vegetation subdivision with wider diversity of species than the Lower Colorado Valley type. Creosotebush predominates, but with a greater number of associated species, including the foothill paloverde, ironwood, mesquite, ocotillo, and small shrubs and grasses. This association provides locally abundant plant cover (U.S. Department of the Interior, 1975).

Representative vegetation of the Lower Colorado Valley subdivision generally occurs on lower bajadas, hills, and intermountain alluvial plains. Partly because this vegetal zone receives only 5 to 10 inches of rainfall annually, the vegetation consists predominantly of low, open stands--either mixed or pure--of creosotebush and bursage (Fugro National, Inc., 1975).

The Sonoran Desert plains of both these subdivisions have low, open stands of creosotebush. The single outstanding characteristic distinguishing the Sonoran Desert from other major deserts of North America, however, is the presence of small drought-adapted (xerophytic) trees and aborescent cacti. These species are best developed in the Arizona Upland subdivision and exhibit a great diversity of size and distribution (Fugro National, Inc., 1975).

Desert grassland is a highly diverse grass-scrub type where grasses are mixed with various woody shrubs, including such uniquely desert grassland dry-tropic species as palmilla, sotol, beargrass, mesquite, crucillo, and grassland species of cholla and other cacti. It is a peculiarly southwestern grassland community, for the most part centered near the international boundary (Brown and Lowe, 1973).

## WILDLIFE

The last southwestern vestiges of grassland communities in Arizona are relatively small, isolated areas of desert grassland within the desert-scrub, such as those on the Pinta Sands in the Tule Desert. These grassland relics occur in local microenvironments where compensatory edaphic factors (soil type, drainage) increase the local soil moisture available to plants.

Figure 2-3 shows the distribution of the LAFR's three vegetation communities:  
Creosotebush-Bursage (Lower Colorado Valley)  
Mixed Paloverde-Cacti (Arizona Uplands)  
Galleta Grass-Scrub (Desert Grassland)

### THREATENED OR ENDANGERED PLANTS

Some of the 106 endangered and 64 threatened plant species for the State of Arizona may occur within the LAFR. Most of these threatened and endangered plants have not been afforded protection under the Endangered Species Act of 1973, and no botanical survey of the LAFR has yet been conducted except in conjunction with specific construction projects such as the MX buried trench and HAVE HOST.

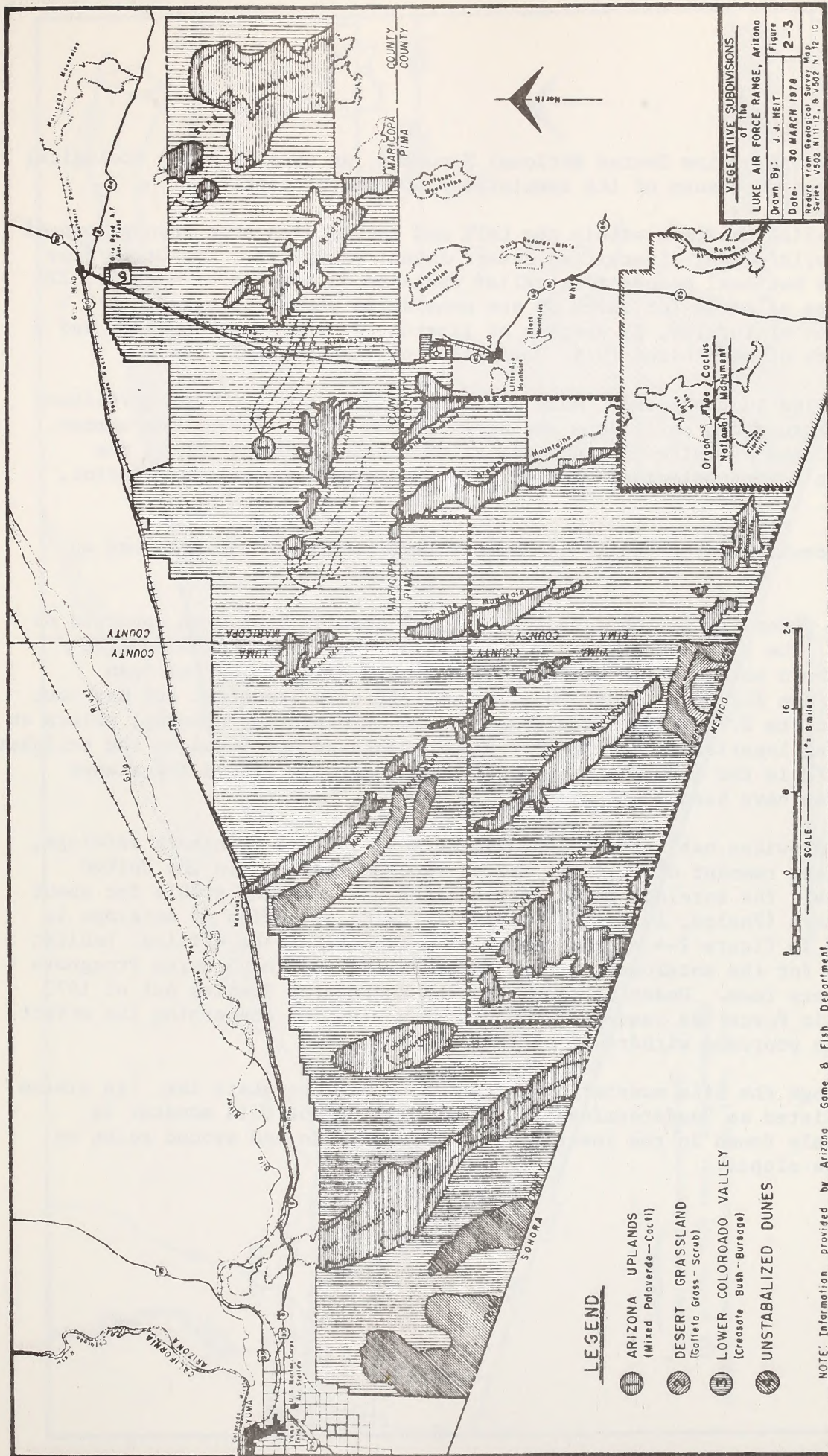
The Cabeza Prieta NWR reports 238 plant species from 57 families. Unusual plants include the elephant tree, senita cactus, and the Mexican jumping bean. The rare Kearney sumac is also found in the refuge (Fugro National, Inc., 1975).

## WILDLIFE

Life-zones are bands or groups of vegetation, including the animals inhabiting them, which vary with latitude and altitude. The LAFR is generally characteristic of the Lower-Sonoran life-zone, as indicated by the presence of the round-tailed ground squirrel, the cactus mouse, and the desert pocket mouse. Desert bighorn sheep and the desert chuckwalla occur in the mountain ranges. The desert kangaroo rat, desert pocket mouse, and numerous species of lizards and snakes, notably the Gila monster and the sidewinder rattlesnake, occupy the open desert valleys (Fugro National, Inc., 1975).

The Cabaza Prieta NWR lies within the LAFR. It was established in 1939 to protect the dwindling population of desert bighorn sheep but also provides habitat for Sonoran pronghorn, javelina, Gambel's quail, and white-winged dove.

The refuge's 860,000 acres are closed to the public except under special circumstances because of its location within the LAFR and closeness to aerial gunnery ranges. Three established Federal research natural areas within the Cabeza Prieta NWR provide excellent opportunities for future scientific work. On the eastern boundary of LAFR and the Cabeza Prieta



## WILDLIFE

NWR is Organ Pipe Cactus National Monument, an area of major ecological importance because of its specialized aborescent cacti.

The varied habitats within the LAFR and surrounding area support one of the world's most diversified desert faunal groupings. The Organ Pipe Cactus National Monument checklist contains 43 species of mammals, 225 species of birds (of which 39 are considered permanent residents), 3 species of turtles, 15 species of lizards, 27 species of snakes, and 5 species of amphibians (U.S. Department of the Interior, 1975).

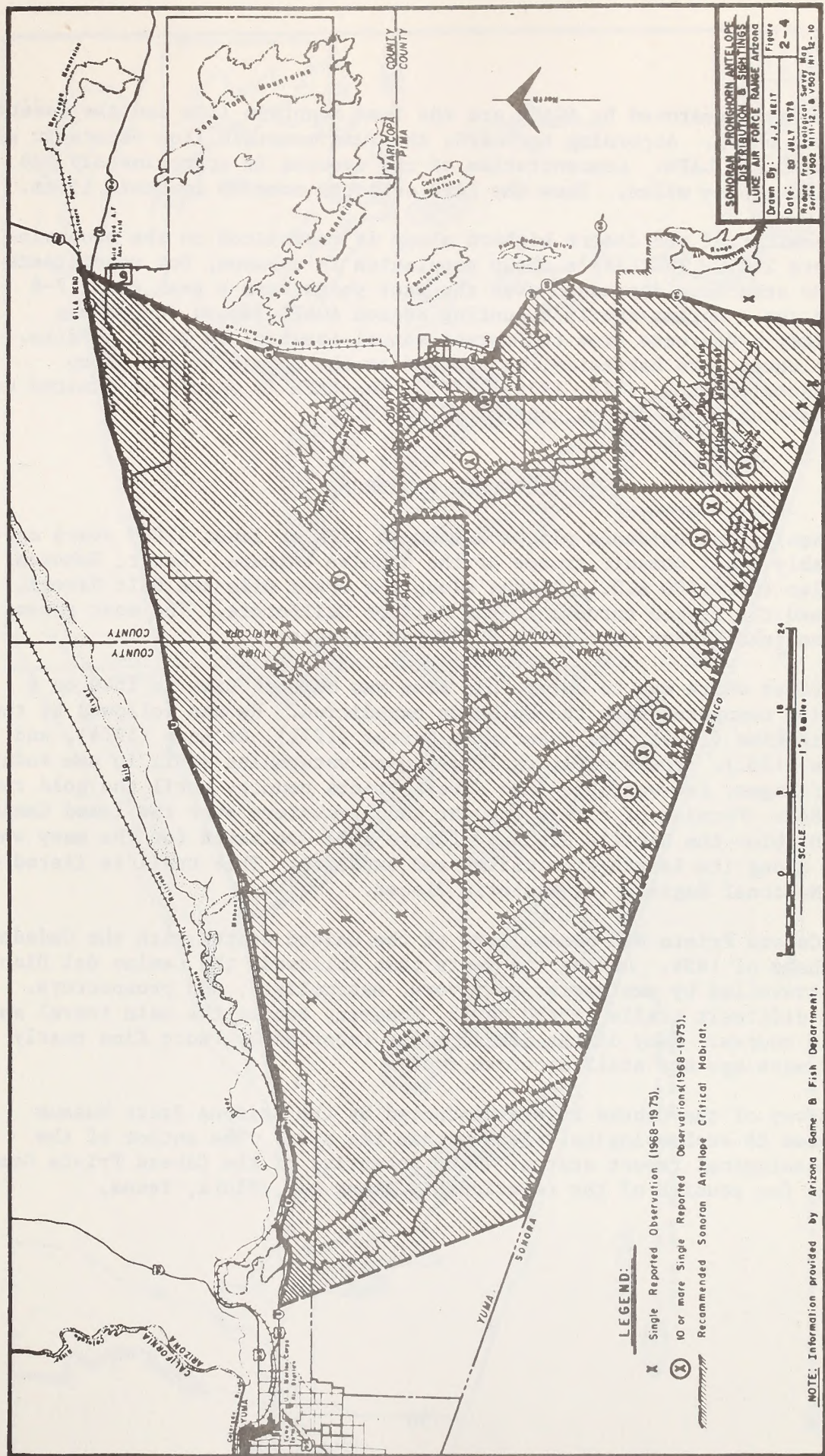
LAFR lies in the path of many migrating birds, who are common visitors mid-February to early June and again in the fall. During the summer, gatherings of white-winged doves at waterholes provide one of the desert's ornithological spectacles (U.S. Department of the Interior, 1976).

No perennial water bodies lie within LAFR, and thus the area has no fish.

Three federally listed endangered animal species have been reported on LAFR. The single known resident endangered species is the Sonoran pronghorn antelope (1978 Federal Endangered List). The American peregrine falcon is known to occur on LAFR as a transient and may nest within the 2.7 million-acre complex. No information, however, exists on nesting locations within LAFR. Also endangered and found on the periphery of LAFR is the southern bald eagle. No federally listed threatened species have been found on LAFR.

LAFR provides habitat for approximately 75 Sonoran pronghorn antelope, the last remnant of the pale-haired race *sonoriensis* in the United States. The antelope population on LAFR has remained stable for about 30 years (Phelps, 1977, 1978, 1979). The distribution of antelope is shown in figure 2-4. This figure also identifies the critical habitat areas for the antelope as recommended in 1977 by the Sonoran Pronghorn Recovery Team. Under Section 7 of the Endangered Species Act of 1973 the Air Force has requested consultation with FWS concerning the effect of the proposed withdrawal on the antelope.

Although the Gila monster is protected by Arizona State law, its status was listed as "undetermined" by FWS in 1973. The Gila monster is commonly found in the lower Sonoran life-zone in and around rocks on bajada slopes.



## CULTURAL RESOURCES

Listed as threatened by AG&FD are the Yuma mountain lion and the desert bighorn sheep. According to AG&FD, the Yuma mountain lion occurs in all parts of the LAFR. Concentration of the species is approximately one per 100 square miles. Thus the LAFR supports some 40 mountain lions.

The habitat of the desert bighorn sheep is restricted to the mountains (figure 2-5). The LAFR's sheep population is unknown, but populations in the area have decreased over the past years from a peak count 7-8 years ago. During the 1978 hunting season AG&FD issued four sheep permits, a decrease from the normal annual issue of 10 to 15 permits. Three sheep were harvested, as opposed to the normal 62-210 sheep harvested (Phelps, 1977, 1978, 1979). The LAFR is opened to limited use for hunting under direct control of AG&FD.

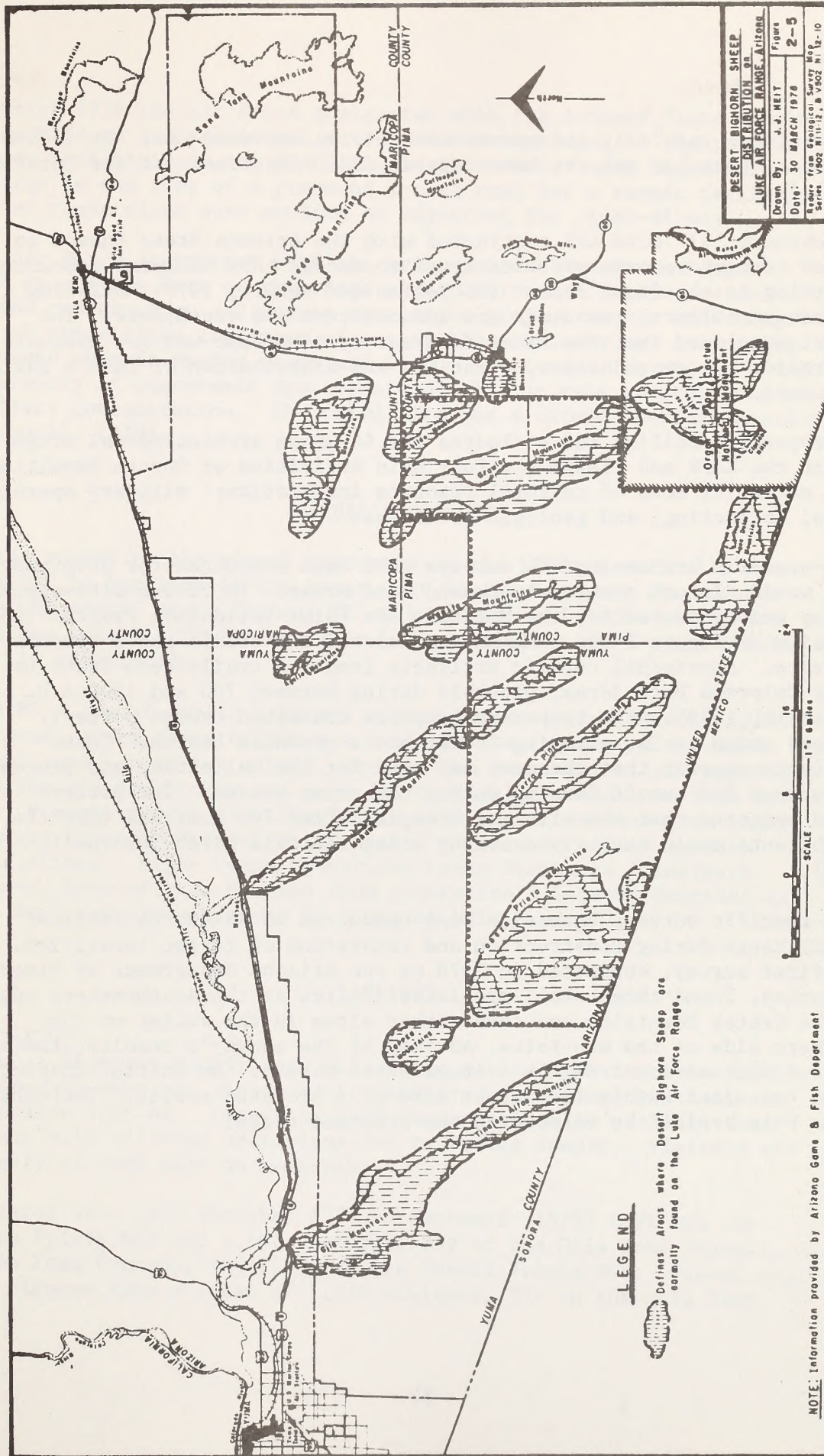
## CULTURAL RESOURCES

Archaeological evidence places humans on LAFR at least 4,000 years ago--probably small nomadic groups of the Cochise culture. Later, Hohokam peoples (300-1400 A.D.), living along the upper Gila and Salt Rivers, crossed the region enroute to the Gulf of California. The most recent Indian inhabitants were the nomadic San Papagos.

The first white man to enter this area was Melchor Dias in 1540 on a mission connected with the Coronado expedition. He was followed by the Jesuit Kino (1699), the Franciscan Garces (1771), De Anza (1774), and Fages (1781). These early explorers used waterholes still in use today. After Fages, few ventured into Cabeza Prieta country until the gold rush of 1849. Promise of riches brought many travelers over the famed Camino del Diablo--the Devil's Highway (figure 1-8)--so named for the many who died along its length from thirst and exposure. This trail is listed on the National Register of Historic Places.

The Cabeza Prieta NWR became part of the United States with the Gadsden Purchase of 1854. During the years that followed, the Camino del Diablo was travelled by explorers, surveyors, naturalists, and prospectors. Less difficult trails to the north, however, became the main travel and trade routes. Many of the descriptions recorded by Padre Kino nearly 300 years ago are still accurate today.

A survey of the Cabeza Prieta conducted by the Arizona State Museum located 28 archaeological sites within the area. The author of the archaeological report states: "The potential of the Cabeza Prieta Game Range for studies of the relationship among men, flora, fauna,



temperature, rainfall, and ground water is an enormous one. It is one, moreover, that has not yet been tapped (U.S. Department of the Interior, 1976)."

In February 1977 Luke AFB contracted with the Arizona State Museum to review current records and literature to assess LAFR cultural resources. According to the final report (McClellan and Volger, 1977), existing records on cultural resources are inconsistent and incomplete. The report concluded that the literature survey data base was not adequate to predict the exact nature, quantity, and distribution of LAFR's cultural resources.

The report identified and evaluated the 46 known archaeological sites within the LAFR and listed the four main activities or forces resulting in a potential loss of cultural resource information: military operations, roads, collecting, and geologic processes.

Site-specific archaeological surveys have been conducted for programs that would disturb previously unused land areas. In 1976 a site-specific survey was conducted for the Multiple Aim Point Validation Program (see MAV site on figure 1-3). The survey located two trails and a temporary campsite. Aboriginal ceramic artifacts from the trails were found to be Lower Colorado Buff Jares, probably dating between 700 and 1500 A.D. (Hucknell, 1979). The temporary campsite contained broken pottery, chipped stone tools, grinding tools, and a probable hearth. These artifacts suggest that the area was used for the collecting and processing or perhaps for runoff farming during the rainy season. The pottery found suggests that the site was occupied after 700 A.D. and that the inhabitants could have lived nearby along the Gila River (Hucknell, 1979).

Site-specific surveys have also been conducted on the North Tactical (NTAC) Range during construction and renovation of target facilities. The first survey, conducted in 1978 by the Arizona Department of Mineral Resources, found three small prehistoric sites at the southwestern edge of the Crater Mountains and three other sites in the valley on the northern side of the mountains. Advised of the survey's results, the Air Force sought advice from the Arizona State Museum. An initial inspection found two sites within the impact zone of a proposed target. The other sites were avoided by relocating the proposed target.

In March 1978 the Air Force contracted with the Arizona State Museum to provide an archaeological survey of the remainder of the proposed target facilities in the NTAC Range. Three additional sites were located in the area of a proposed access road for a target facility. Two of these sites were avoided by adjusting the right-of-way.

The Air Force contracted with the Arizona State Museum in August 1978 to salvage data on the three sites that could not be avoided in the construction and target renovation project on the NTAC Range. One of these sites consisted of two small, spatially and temporally separate ceramic period sherd and lithic scatters. The second site, apparently of preceramic age, consisted of four rock clusters and an artifact concentration. The third site was a ceramic period campsite (Hucknell, 1979).

### VISUAL RESOURCES

Public access to the visual resources on the LAFR is generally restricted to portions of the range next to the highways (Interstate 8 on the north, State Highway 85 on the east, and Mexico's Highway 2 on the south). Public entry to LAFR, including the Cabeza Prieta NWR, is restricted.

Only 80 miles of public highways either border or cut through LAFR. The areas along these highways are within the foreground or middle ground zone (up to 3-5 miles), whereas the remainder of the perimeter is either in the background zone (5-15 miles) or cannot be seen at all. Present target distribution in LAFR cannot be seen from these highways because of intervening higher terrain or safety setback restrictions. Night range operations using flares to illuminate targets, however, can be seen from Interstate 8 between Sentinel and Gila Bend and along Highway 85 south of Gila Bend.

### LAND USE

#### RECREATION

The most frequent nonmilitary activities on the LAFR involve wildlife management, camping, sightseeing, photography, hiking, hunting, and scientific studies. Access to LAFR is controlled to preclude interference with military operations and to reduce danger. Visitors are normally allowed only on weekends.

In fiscal year 1978 (October 1977 to September 1978) LAFR and the Cabeza Prieta NWR had 1,540 visitors, 299 to the Gila Bend Segment, 243 to the Yuma Segment, and 1,198 to the Cabeza Prieta NWR. Fiscal year 1979 figures show a total of 1,410 visitors, 352 to the Gila Bend

Segment, 376 to the Yuma Segment, and 682 to the Cabeza Prieta NWR. Visitors to one of the three segments are restricted to that particular area during their visit.

#### LIVESTOCK GRAZING

A small number of cattle and goats graze the LAFR. Wild horses have also been sighted. And some wild burros may also inhabit the area, since they occur at Organ Pipe Cactus National Monument (Dodson, 1977, 1978).

A lack of fences allows cattle to trespass on the LAFR in search of forage. Cattle mostly concentrate close to the Gila Bend AFAF and the extreme eastern portion of the LAFR. Trespass cattle usually belong to ranches having grazing allotments on public land next to the LAFR. LAFR and the ranchers have good relationships, and trespass cattle are normally removed promptly. In addition, 125 cattle are permitted to graze on a portion of the Cabeza Prieta NWR (Dodson, 1977, 1978). These cattle also migrate, since the area is unfenced.

#### MINERALS

Little mineral information exists for the LAFR, and existing information covers only 30 percent of the area--that having exposed bedrock. The Arizona Department of Mineral Resources (ADMR) conducted a Level I mineral survey for the LAFR and adjacent land, finding great variation in the amount, nature, and accuracy of existing data. Most of the data were published before 1934 (Miller, 1978).

The ADMR report concludes that the LAFR may have some mineral potential, since almost all of the 32 southeast Arizona mines brought into production between 1940 and 1976 were developed by the application of modern exploration, mining, and extractive technologies (figure 2-6). Many of the new deposits, including several local copper finds, occur within the same geological province as the LAFR. The report recommends on-site mineral resource studies be conducted to provide a data base for evaluation (Miller, 1978).

In February 1979 the U.S. Geological Survey (USGS) began a geology and mineral survey of the Ajo 2 degrees by 1 degree quadrangle under the Coterminous United States Mineral Appraisal Program (CUSMAP). The survey is projected to take 4 or 5 years to complete and will also investigate geothermal potential. Figure 2-6 shows the Ajo quadrangle superimposed over the LAFR. The remainder of the range (on the Yuma side) would be covered by the El Centro quadrangle under the CUSMAP. No date, however, has been scheduled for the completion of this quadrangle. In December 1979 the USGS Ajo quadrangle project coordinator stated that the only existing information consists of raw data of various disciplines. The data have not been integrated, and therefore the mineral potential of the LAFR cannot be adequately assessed (Haxel, 1979).

# ARIZONA METAL MINES

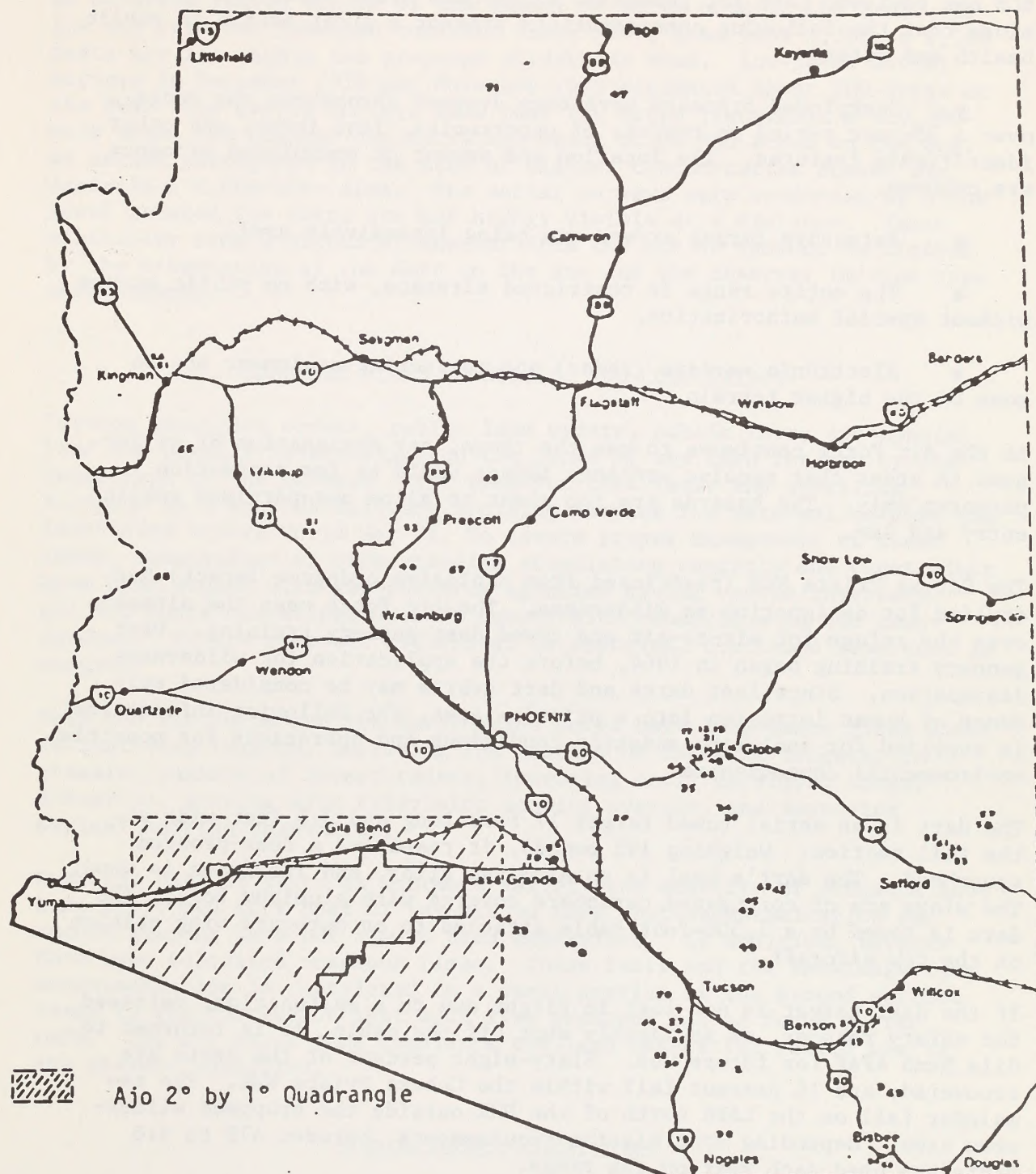


FIGURE 2-6

### WILDERNESS

BLM has reviewed LAFR for potential wilderness study areas and determined that the following considerations present a great hazard to public health and safety:

- Unexploded ordnance have been dropped throughout the range over a 35-year period on targets of opportunity, land forms, and other identifiable features. The location and amount of unexploded ordnance are unknown.
- Extensive target arrays are being intensively used.
- The entire range is restricted airspace, with no public access without special authorization.
- Electronic warfare (radar) and monitoring equipment are on some of the higher terrain.

If the Air Force continues to use the range, any designation of wilderness in areas that receive ordnance impact would be for protection purposes only. The hazards are too great to allow unsupervised public entry and use.

The Cabeza Prieta NWR (restricted from explosive ordnance impact) has applied for designation as wilderness. The Air Force uses the airspace over the refuge for air-to-air and towed dart gunnery training. Dart gunnery training began in 1964, before the application for wilderness designation. Since lost darts and dart debris may be considered evidence of human intrusion into a pristine area, the following information is supplied for analyzing existing conditions and operations for possible environmental consequences.

The dart is an aerial towed target 17 feet long and 3.5 feet wide at the tail section. Weighing 195 pounds, it resembles a four-pronged spearhead. The dart's keel is an aluminum alloy, and its frame is wood. The wings are of corrugated cardboard covered with aluminum foil. The dart is towed by a 1,500-foot cable attached to an outboard wing station on the tow aircraft.

If the dart target is not lost in flight due to a malfunction, released for safety reasons, or accidentally shot off the cable, it is returned to Gila Bend AFAF for future use. Sixty-eight percent of the darts are recovered, and 16 percent fall within the Cabeza Prieta NWR. The remainder fall on the LAFR north of the NWR outside the proposed wilderness area. Depending upon mission requirements, between 470 to 510 darts are used each year on the range.

No accurate record exists of the number of darts used in the past. If the use rate has remained constant since 1964, then from 1,200 to 1,300 darts may lie within the proposed wilderness area. Low-level aerial surveys in December 1978 and November 1979 estimated about 600 darts on the NWR. The aerial surveys show that the darts lie within a 310,000-acre area, the highest concentration being on 76,800 acres in the NWR. An aerial photograph in the area of highest concentration showed six darts in a 2,000-acre area. The aerial surveys were conducted at a low level because the darts are not highly visible at a distance. Their visibility from a distance, whether from the air or ground, is limited by the orientation of the dart to the sun and the observer (mirror type reflections).

#### LAND USE PLANS, CONTROLS, AND CONSTRAINTS

Various executive orders, public land orders, public laws, and special land use permits have designated the lands of the LAFR for use by the Department of the Defense. The need for LAFR lands and overlying airspace as a weapons delivery training complex for national defense was identified before World War II. To assure proper management of these lands, memorandums of understanding stipulating controls and constraints have been signed with governmental agencies having vested interests. All Air Force operations on LAFR comply with conditions in the memorandums. If the proposed withdrawal is approved, continued adherence is assured.

Both the Air Force and the Navy/Marine Corps have long-range plans aimed at improving targets, improving the scoring of tactical targets, increasing numbers of threat radars, improving newly developed target scenarios, scoring with television scoring systems, and improving optical scoring capability.

Over the past 35 years an enormous variety and quantity of ordnance have been delivered to a host of targets on LAFR, but decontamination and record keeping have not always been emphasized. In addition, targets have been relocated numerous times. These facts and the knowledge that decontamination is restricted to a small portion of the ground surface leads to the conclusion that much live ordnance can be found on the LAFR. The Air Force thus considers the land unsafe for public use in its present condition.

#### SOCIOECONOMIC CONDITIONS

Socioeconomic conditions affecting and affected by LAFR cannot be discussed without defining the zones of influence. The primary range users determine the three influence zones:

## SOCIOECONOMIC CONDITIONS

| Primary User      | Major City/Town    | County   | Zone    |
|-------------------|--------------------|----------|---------|
| Luke AFB          | Glendale/Chandler* | Maricopa | Phoenix |
| MCAS, Yuma        | Yuma               | Yuma     | Yuma    |
| Davis-Monthan AFB | Tucson             | Pima     | Tucson  |

\*Luke AFB has a squadron of F-5 aircraft at Williams AFB in Chandler.

### POPULATION

Having relatively smaller percentages of military/dependent in their population than Yuma, the Tucson and Phoenix zones of influence could more easily absorb potential socioeconomic changes as a result of mission changes on the LAFR. Table 2-6 provides population data on the percentage of military population in the communities.

TABLE 2-6  
CITY POPULATION VERSUS MILITARY POPULATION, 1978

| City      | Population** | Installation<br>Population* | Installation % of<br>City Population |
|-----------|--------------|-----------------------------|--------------------------------------|
| Phoenix   | 716,100      | 15,497 (Luke AFB)           | 2.2%                                 |
| Tucson    | 311,400      | 12,035                      | 3.9%                                 |
| Yuma      | 39,700       | 9,525                       | 23.9%                                |
| Gila Bend | 2,400        | 884                         | 36.8%                                |

\*Installation population = total military personnel and dependents of military.

\*\*Source: Valley National Bank of Arizona, 1979.

### EMPLOYMENT

The principal industries in Arizona are manufacturing (\$3 billion in output in 1977), tourism (\$2.8 billion in expenditures in 1977), agriculture (\$1.9 billion in 1977), and mining (\$1.5 billion in 1977). Nearly 50 percent of the employers in Arizona are in Maricopa County (the Phoenix zone). A total of 27,918 military personnel and their dependents are affected by LAFR. Employment figures for June 1978 in the three zones of influence are provided in table 2-7.

TABLE 2-7  
EMPLOYMENT/UNEMPLOYMENT DATA, JUNE 1978

| Zone*   | Total<br>Employed | Total<br>Unemployed | Unemployment<br>Rate |
|---------|-------------------|---------------------|----------------------|
| Phoenix | 604,500           | 31,900              | 5.3%                 |
| Tucson  | 178,200           | 8,900               | 5.0%                 |
| Yuma    | 27,350            | 3,250               | 11.9%                |

\*Phoenix, Tucson, and Yuma zones include Maricopa, Pima, and Yuma Counties respectively.

Source: Valley National Bank of Arizona, 1979.

#### INCOME

In 1975, personal income in Phoenix, Tucson, and Yuma amounted to \$7 billion, \$2.4 billion, and \$0.4 billion respectively. From 1966 to 1975 annual per capita personal income in the area of influence increased by an average of \$312. Projected personal income for 1980 is shown in table 2-8, which gives the economic influence of the major military bases in the area.

Yuma County's prime earnings generator is agriculture, and the combination of trades and services also holds a strong position. The government sector earns about as much income as agriculture, military activities accounting for much of this sector's earnings.

Maricopa and Pima Counties, on the other hand, exhibit some of the character of a post-industrial economy, where a large manufacturing capacity has been overshadowed by the more rapid growth of trade, services, and local government.

The prediction for Arizona's future is that tourism and manufacturing will steadily increase, while agriculture will decline as a prominent producer of the State's income (Boucher, 1979).

TABLE 2-8  
ECONOMIC DATA ON ZONES OF INFLUENCE

| Zone*   | Projected 1980<br>Total Personal<br>Income<br>(Millions) | 1979<br>Base<br>Payroll** | 1979<br>Local<br>Contracts** | % of Total<br>Personal Income<br>From Payroll<br>and Contracts |
|---------|----------------------------------------------------------|---------------------------|------------------------------|----------------------------------------------------------------|
| Phoenix | 879.50                                                   | \$140,567,493             | \$36,146,033                 | 1.5%                                                           |
| Tucson  | 4,012.00                                                 | 114,896,668               | 11,340,787                   | 3.2%                                                           |
| Yuma    | 495.48                                                   | 38,100,000                | 122,142                      | 8.1%                                                           |

\*Phoenix, Tucson, and Yuma zones include Maricopa, Pima, and Yuma Counties respectively.

\*\*For Luke AFB, Davis Monthan AFB, and Yuma MCAS.

Source: Valley National Bank of Arizona, 1979.

#### ATTITUDES AND EXPECTATIONS

Arizona rural and urban leaders seem concerned with energy conservation, quality of the environment, and residential/State development. The attitude toward land use is to allow development.

Although local communities in Arizona generally favor military installations, attitudes of communities toward bases vary according to the population makeup. Several retirement communities near Luke AFB complain about the noise from jet aircraft. In the same area, the community of Glendale annexed property surrounding Luke AFB to help prevent residential encroachment. Special interest groups and developers in the Tucson and Phoenix zones have expressed a desire to expand residential communities near bases. The major expectation of the area is that a population increase will additionally burden communities but that the social group structure will remain the same.

#### HAZARDS AND SAFETY

The main hazards associated with the use of LAFR are aircraft noise, sonic booms, and range contamination from unexploded ordnance.

Objectionable noise from military aircraft originates from low-altitude subsonic training flights at 500 to 1,500 feet above ground level (including bombing and strafing passes at targets) and from supersonic air combat maneuvers.

Low-altitude subsonic training flights are noisy and may be annoying. An individual standing beneath a low-level flight hears sounds up to approximately 110 dB(A)(decibels)\*. Considering the speed of the aircraft, the sound would only be audible for approximately 10 seconds, and the loudest sound would last less than 2 seconds.

Supersonic flight is primarily associated with mock aircraft duels held in air combat maneuvering (ACM) areas and air-to-air ranges. These training missions are expected to generate some sonic boom overpressures up to 5 pounds/square foot, which may extend in width on the ground from 30 to 35 miles at boom cutoff. Overpressure on the ground at the cutoff point may be between 0.6 and 1.2 pounds/ square foot, depending on source, mach number, and type of aircraft.

Air combat maneuvering occurs within the 12 separate ranges and target complexes. All operations are conducted at various altitudes but usually below 24,000 feet. Generally, when pilots fly below this altitude, their air speed is below mach 1. All air combat maneuvers however, should be considered as supersonic during some portion of the flight. During a mock duel, the aircraft usually fly only briefly at supersonic speeds.

Existing restrictions require that supersonic flights avoid populated or otherwise sensitive areas.

Aircraft generally fly at supersonic speeds in the center of each training area. Yuma area residents have complained about MCAS supersonic flights, but flight patterns have been adjusted so that the ground overpressures caused by the sonic booms do not cross the northern boundary of the range. This action has ended noise complaints from Yuma.

On portions of the LAFR, explosive ordnance have been used, and unexploded ordnance above and below the surface remain a potential hazard. Locating and disarming these explosives would be a monumental and expensive task. Consequently, public access must be restricted.

Fire hazard and its potential on the LAFR are slight due to a lack of vegetation and sparseness of tree growth. Desert soils around vegetation in washes and low-lying areas prevent the spread of fire.

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\*See glossary for a definition of decibel. The measurement 110 dB(A) represents the sound created by a riveting machine. The Occupational Safety and Health Administration (1975) limits to 30 minutes per day the permissible exposure to 110 dB(A).



## CHAPTER 3

### ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Chapter 3 describes the impacts to the existing environment if the Air Force is granted continued withdrawal of the public lands for use as the Luke Air Force Range (LAFR). Potential impacts are discussed and described in relation to ongoing military training as conducted for many years and as forecast for the future.

#### AIR QUALITY

Aircraft emissions and fugitive dust from construction and range maintenance will degrade local air quality. The amount of dust generated from heavy construction is directly related to the area being worked, level of activity, soil type, and soil moisture content. Future range operations and maintenance, including target upgrading, should be at the same level as at present and thus should not generate significantly more dust.

The only expected increase in dust would occur in the Yuma Segment, where the Marine Corps would be using the mobile land targets (MLT)--remotely controlled vehicles similar to dune buggies, which drag target sleds across the terrain 75 to 100 feet behind the vehicle. The force of the dune buggy wheels will pulverize surface materials. Soil particles will be lifted and dropped from the rolling wheels, and the ground will be exposed to strong air currents in turbulent shear with the surface.

These forces create saltation (the bouncing, jumping motion of sand grains), which leads to surface creep, fracturing of large grains, and air suspension of fine particles. Since the target sled is the tubular rack (base) from a helicopter and the rack tracks are dragged parallel to the direction of travel, saltation is created primarily by wind turbulence. MLT could generate much dust in the local area. The dust, however, is expected to settle quickly and not significantly affect air quality.

Military aircraft operations should remain at about the same level as at present. The Air Quality section of chapter 2 provides two simplistic approaches to estimate aircraft emission impact on ambient air quality in the area. Data provided in table 2-4 for current operations show a negligible impact. Continued operations would thus not significantly impact ambient air quality.

#### TOPOGRAPHY AND GEOLOGY

Construction of proposed facilities and continued operation of LAFR would only slightly impact topography and should not impact geology. Only a few

land features would be changed by construction. Table 1-5 lists the activities that would impact the surface and alter local topography. Ordnance dropped on the range would continue to scar the surface, but this impact would occur within the area already impacted by target construction.

#### SOILS AND WATERSHED

The proposed action could have the following impacts on soil and watershed:

- Sheet and rill erosion could result from soil compaction, which could also reduce infiltration rates.
- Vegetation could be displaced, causing a rain drop splash effect with subsequent overland flow and erosion.
- Soil profiles developing congruently with natural vegetation could be interrupted.
- Disruption of the desert varnish and exposure of loose soil could increase wind erosion.

The soil profiles of LAFR will be impacted by the proposed construction, MLT operations, and continued ordnance clearance. During ordnance clearance off-road vehicles would scar the desert floor, leaving tracks that would be visible for many years.

The cumulative impacts on the soil profiles of LAFR, however, would not be significant. Presently 9,500 acres are impacted on the range (see table 1-5--about 0.35 percent of the total acreage. Proposed construction and continued use would impact an additional 3,300 acres (see table 1-5) for a total cumulative impact of 0.48 percent of the total LAFR. None of these impacts would occur in the Cabeza Prieta NWR or in the proposed wilderness area.

#### WATER RESOURCES

The activities on the LAFR are not expected to have any significant impact to surface (springs) or subsurface waters.

Wells provide the 332,000 gallons of water per day (372 acre-feet per year) required for the Gila Bend AFAF support facilities and for maintenance and construction on the LAFR. This water comes primarily from the Gila Bend basin aquifer. The aquifer is being overdrafted (see table 2-6) at a rate that gives the aquifer a 588-year life. Although the water may need to be reapportioned in the future to assure a dependable supply, Gila Bend AFAF and LAFR water requirements little affect the overdraft rate. The military requirement represents only 1.5 percent of the dependable supply and 0.3 percent of total depletion from the Gila Bend basin aquifer. Agricultural irrigation is the predominant user.

## VEGETATION

The proposed withdrawal would clear vegetation in the creosotebush-bursage association in construction areas and would damage vegetation during ordnance clearance on 330,000 acres. The outlying field (OLF) planned by the Marine Corps would disturb over 3,350 acres of vegetation. The OLF is not programmed for construction, and it is of such scope that a separate environmental assessment/statement would be needed to address site-specific impacts.

Construction for future operations would impact 30 acres for Air Combat Maneuvering Instrumentation (Luke ACMI), WISS, and TOSS telemetry sites. The MLT operations will impact 120 acres, but only 60 of these contain vegetation (see table 1-5).

Explosive ordnance disposal (EOD) on 330,000 acres of LAFR would trample and crush vegetation. During EOD, four-wheel drive vehicles sweep the ranges and pick up all surface ordnance near the target complex. Although 330,000 acres would be surveyed, vegetation would be disrupted on only 3,100 acres. Vehicles would use the same road ruts in the desert as they have in the past, protecting the desert varnish and reducing the crushing of vegetation. Ordnance and surface debris would be collected on foot, reducing trampling and crushing.

Adding the acreage of future vegetation impacts (3,240 acres) to existing disturbed land (9,500 acres) would result in a cumulative impact to 12,740 acres or 0.48 percent of the LAFR. These impacts would occur primarily in the creosotebush-bursage plant community (see figure 2-3).

Range operations would not significantly impact the State of Arizona threatened and endangered plant species.

Although the entire range complex has not had a botanical survey, site surveys for the HAVE HOST and MX Buried Trench projects found no endangered or threatened plants. Before construction in a new area, the area is surveyed to assure protection of threatened or endangered species.

Additional impact to vegetation, including threatened and endangered species would occur if EOD requires subsurface clearance. Subsurface clearance, involving discing of the soil, is presently conducted on the four manned ranges at some targets to clear the area and control ricochets (each disced area measures 100 x 350 feet--a total of 12.9 acres for four sites). Subsurface clearance is extremely disruptive in other areas of the range and is therefore not conducted in areas beyond the immediate target. Any subsurface clearance of other than target areas would require a separate environmental impact assessment/statement to address site-specific impacts.

## WILDLIFE

A primary impact to wildlife of the proposed withdrawal and associated construction is the destruction of habitat. Ground cover represents wildlife food, nesting sites, and protection from the desert climate. Only a small percentage of habitat would be impacted, and impacts would be hardly noticeable. Some animals might die due to population dynamics or the animal's inability to adapt to new locations.

Range upgrades include electronic warfare equipment, which could create an increased potential for electromagnetic/radio frequency radiation exposure. Of the various emitters used, the ground transportable radar units represent the only hazard to wildlife. Wildlife within 50 feet of the emitter will be exposed, but the extent of the overexposure hazard is reduced by height. This beam is routinely operated at no lower than 8 feet, and the possibility of an animal being within 50 feet at a height exceeding 8 feet is small. Birds may be briefly exposed if they fly through the beam within 50 feet of the transmitting antenna. Microwave radiation from these radars are similar to existing military and civilian radar systems, which have been operating continuously for years without any noticeable ecological damage.

The continued restriction of public entry would benefit wildlife. AG&FD believes that the Sonoran pronghorn antelope (an endangered species) exists in Arizona only because of the extremely limited public use of the LAFR (Carr, 1977).

## CULTURAL RESOURCES

Unidentified cultural resources on the LAFR could be impacted by weapons delivery to targets, ordnance recovery (clearance), and road and target construction. To assure the resources are protected, the Air Force has adopted an affirmative action policy to survey the entire LAFR. A cultural resource management plan is in the development state and is based on recommendations provided by the Arizona State Museum (McClellan and Vogler, 1977). Class surveys will be conducted as funds are appropriated.

Since only a small percentage of the LAFR ground surface is disturbed by military operations, continued withdrawal with restricted public access would help preserve the cultural resources on the range.

## VISUAL RESOURCES

The proposed action should have no significant impacts on visual resources next to LAFR. Programmed range activities, including range improvements, will be in the background visual zone (5 to 15 miles), but present target locations are not within line of sight of the motorist using Interstate 8, State Highway 84, or Mexico's Highway 2.

Continued use of the airspace above the Cabeza Prieta NWR will increase the amount of darts and dart debris on the ground: 150 to 160 darts per year with 75 to 80 of these falling in the proposed wilderness area. The highest area of dart concentration is in the lower San Cristobal Valley, immediately

west of Granite Mountains 30 miles west of Ajo. FWS personnel at the Cabeza Prieta NWR indicate that between 5 to 10 people each year visit the dart area, and their wilderness experience might be spoiled by the presence of darts. Visitors, however, would see only those darts within their near field vision and those seen as reflections. Since the most dense dart area found by aerial survey contained six darts in 2,000 acres, the darts would have slight impact on the total resources.

All visitors to LAFR and to Cabeza Prieta NWR know they are going onto an active military range and are required to sign a hold harmless agreement. Their attitude toward visual resource impacts thus may already have been tempered. Should the Air Force and FWS decide to develop a range clean-up program, the quality of visual resources would improve.

## LAND USE

### RECREATION

Recreation on the LAFR has been restricted for many years due to national security and safety considerations. Restrictions imposed on recreation will continue under the proposed withdrawal. Hunting and other activities would continue to be permitted when they can be safely conducted in consonance with the objectives of other regulatory activities, such as the control of bighorn sheep and quail hunting by AG&FD.

### LIVESTOCK GRAZING

Continued withdrawal and use of LAFR would prevent BLM's allocating grazing there. This position is considered necessary to protect the safety of ranchers and their cattle and at the same time preserve the forage for wildlife that inhabit the range.

### MINERALS

The value of sand and gravel deposits and possible base and precious metals on the LAFR is recognized; other mineral commodities may occur. Mining is incompatible with the current military use of LAFR, but if the land is returned to the public in the future, the materials would be available for development. Should the U.S. Geological Survey's survey of the Ajo quadrangle discover a commodity vital to the national needs, the LAFR withdrawal may have to be modified and a mineral management plan developed by appropriate parties.

### WILDERNESS

Flights over the Cabeza Prieta NWR proposed wilderness area could produce high enough noise levels to impact wilderness users and wildlife in the immediate area. Further, the presence of military ordnance, debris, and lost aerial dart targets could detract from wilderness values.

Over the last 35 years an enormous variety and quantity of ordnance have been delivered to targets on and in the airspace over LAFR, and ordnance has been and is being released under emergency conditions. In addition, bombs were dropped in valleys of certain sections of the Cabeza Prieta NWR early in the history of LAFR. The chances are good of finding live ordnance

## HAZARDS AND SAFETY

on and below the surface. Unexploded ordnance on the range is a safety hazard, which warrants restricting general public access.

### LAND USE PLANS, CONTROLS, AND CONSTRAINTS

The proposed action would have no impact on current land use plans, controls, and constraints. Memorandums of understanding between use agencies provide necessary controls to guard against land use conflicts. These agreements have been effective in the past and have prevented conflicts. These agreements will be continued if the withdrawal is renewed.

Construction and future operations will comply with all applicable land use laws, and land use should not be impacted.

The withdrawal may have undetermined impact on a proposed BLM Greenbelt Planning Unit along Interstate 8. This Greenbelt unit involves a portion of the 17,131 acres under the proposed withdrawal that is currently withdrawn under BLM special land use permit. The military withdrawal would nullify this permit, remove the land from the Greenbelt Planning Unit, and prohibit mining and mineral leasing in the area.

### SOCIOECONOMIC CONDITIONS

The socioeconomic structure in the area of influence should not be significantly impacted. Military personnel will work on all construction and improvements except for installation of the ACMI equipment. The number of contractor workers needed to install the ACMI, is insignificant compared to the number of support personnel at Gila Bend AFAF and Yuma MCAS and would not produce a significant impact.

The OLF planned by the Marine Corps would be constructed by contract. But the project is in the early stage of planning, and its construction is not certain. Before a final decision, the Marine Corps will evaluate the environmental impacts of the project.

Since the proposal is not projected to increase personnel or change dollar flow to the communities, it would have no significant impacts on socioeconomic conditions in the area.

## HAZARDS AND SAFETY

### EFFECTS ON ANIMALS

Wildlife exposure to loud noises and sonic booms has been evaluated, but the studies mainly concern animals in captivity rather than in nature. Generally, the most delicate and sensitive behavior of animals involves reproduction. The impact of noise on reproduction has not been well documented. Most literature suggests that animals are little affected by jet aircraft noise

(Chavis, 1979). Animals apparently can undergo temporary threshold shifts when exposed to low sound pressure levels of 70-90 dB(A) to accommodate to noise. Animals appear to be more aware of moving objects than of sound.

Concern would thus lie in those areas where aircraft are low to the terrain. In these instances, aircraft will be low enough to appear to be directly above the animal and would thus threaten it. Research, however, has been insufficient to test and confirm such a hypothesis.

Existing data suggest that big game do not change their behavior appreciably, although they may show momentary concern. Panic reactions apparently are rare. Desert bighorn sheep have been observed by FWS personnel to offer no reaction to sonic booms (Furlow, 1979). Multiple sonic booms repeated several times a day might cause mule deer to become edgy and move around more, but the effect of sonic booms on breeding behavior is unknown.

According to Bell (1972), a domestic or pet animal may react to a boom, a simple startle response being the most common reaction. Specific reactions differ according to the species involved, whether the animal is alone, and perhaps whether it has had previous exposure. Occasional trampling, moving, raising of the head, stampeding, jumping, and running have been reported. Birds occasionally run, fly, or crowd. Animals react to sonic booms much as they react to low-level subsonic airplane flights.

Because LAFR has been operating for many years, animals living there can be assumed to have adapted to the intermittent high noise and sonic booms. LAFR operations would not change significantly, and no additional impacts are expected.

#### RANGE FIRES

Range fires caused by live ordnance are extremely rare. The area has been described as an asbestos belt with low fire potential. Such fires, if ignited would probably be confined to small areas. From January 1976 to July 1978 the LAFR has had five range fires, four caused by ordnance and one by an aircraft crash. The fires destroyed 5 acres of vegetation.

#### ACCIDENT SAFETY

Aircraft accidents and falling debris occasionally occur on LAFR, and thus all manned and unmanned ranges have extended boundaries to protect the neighboring population and buildings. Restricted entry and exit procedures also provide increased protection. The infrequency and unpredictability of such incidents makes difficult the assessing of impacts on wildlife, vegetation, and soil. The area impacted is extremely small, and the impact is slight when all factors are considered. Continued withdrawal will not change the frequency of these incidents.



## CHAPTER 4

### MITIGATING MEASURES

The following committed measures will minimize the impacts that cannot be prevented.

By Air Force regulation, Luke AFB has established an environmental protection program, encompassing Gila Bend AFAF and the LAFR. The program is managed by the Environmental Protection Committee, and each base agency establishes internal procedures to monitor actions that may affect the environment. The committee reviews proposed actions and selects measures to mitigate potential adverse environmental impacts. Future actions on the range having potential impacts are assessed before the decision is made to implement an action.

### AIR QUALITY

The Air Force is replacing older aircraft with the more modern F-15, F-16, and A-10 fighters. The newer fighters are quieter and except for a slight increase in nitrogen oxides in some cases, emit fewer pollutants than the F-4, F-100, and F-104 aircraft. Although the rate of replacement and the mix of old and new aircraft cannot be projected, emissions will decrease over the period of the proposed withdrawal.

### TOPOGRAPHY AND SOILS

Siting of facilities and operations on the range will follow environmentally sound engineering practices. Water bars and culverts will be constructed where appropriate to reduce erosion and drainage pattern changes.

Future use of LAFR would continue to restrict ground vehicles to existing roads, except during explosive ordnance disposal (EOD). Vehicles used for EOD clearance will continue to be restricted to existing ruts created by previous clearance operations, helping preserve the desert varnish and reduce wind and water erosion.

### VEGETATION

Crushing and trampling of vegetation during EOD clearance will be reduced by clearing much of the area on foot. Where vehicles are required,

## MITIGATING MEASURES

oversize tires will be used. The ground will be disced and mulched for EOD clearance and ricochet control only immediately near targets and only as required for safety.

Arizona State law provides that the Arizona Commission of Agriculture and Horticulture be given at least 30 days notice before construction to inspect an area and salvage State-protected plants. Salvage will be encouraged where construction cannot be relocated to an acceptable site.

## WILDLIFE

The Air Force, BLM, FWS, and AG&FD have developed cooperative agreements for wildlife management. These agreements are under review and are planned to be expanded to cover vegetation, minerals, and cultural values on the LAFR.

## CULTURAL RESOURCES

Until the Class II cultural resource surveys are completed on LAFR, the Air Force policy to conduct site-specific surveys for new operations and facilities will be strictly followed. Where possible, targets and facilities will be located not to jeopardize cultural sites. If operations cannot be relocated, BLM and the State Historic Preservation Officer will be consulted for additional mitigation measures or data recovery.

## WILDERNESS

Under the existing cooperative agreement the Air Force will continue to work with Cabeza Prieta NWR in resolving the visual impacts of darts within the proposed wilderness area.

## CHAPTER 5

### UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are those impacts discussed in chapter 3 that would not be mitigated by the measures discussed in chapter 4. Such impacts are often referred to as "residual" impacts. They are unavoidable mainly because either (1) the proposed action directly conflicts with another value or values or (2) the cost of mitigation would be prohibitively high.

#### AIR QUALITY

Fugitive dust and aircraft emissions would have an insignificant but unavoidable adverse impact on air quality. Construction-generated dust would be temporary and localized, whereas wind and vehicles would intermittantly stir up dust.

#### TOPOGRAPHY

Some land features will be altered by proposed construction. The size of the impacted area, however, would be small in comparison to the total area of the LAFR.

#### SOILS AND WATERSHED

Existing operations affect 9,500 acres. The proposed action would increase this figure to 12,800 acres or 0.48 percent of the LAFR. This impact includes both surface and subsurface soil disturbance caused by construction, EOD clearance, and ordnance delivery. The following unavoidable adverse impacts can be expected.

- Sheet and rill erosion would result from any soil disturbance.
- Soil compaction would reduce infiltration rates.
- Vegetation would be displaced, causing a raindrop splash effect and overland flow and erosion.
- Soil profiles that have developed with natural vegetation would be interrupted.
- Disruption of the desert varnish and exposure of loose soil would increase wind erosion.

#### VEGETATION

The proposed action would unavoidably disturb vegetation on 0.48 percent of the LAFR, having the greatest effect on the creosotebush-bursage community, which constitutes 85 to 90 percent of the LAFR.

#### WILDLIFE

The continued withdrawal would disturb vegetation comprising wildlife habitat, and possibly expose wildlife to electromagnetic radiation. Where vegetation habitat is damaged or destroyed due to EOD clearance or construction, wildlife would either adapt or be forced to relocate in a similar creosotebush-bursage community. Individual animal deaths might result.

#### CULTURAL RESOURCES

Inadvertent bombing, EOD clearance, and construction could impact previously unidentified cultural resources. Inadvertent bombing, though rare, occurs during emergencies, when targets are improperly identified or when bombs are released too early or too late to hit the target.

#### VISUAL RESOURCES

Construction and operational debris would disturb visual resources. Construction would occur at sites generally not visible outside range boundaries, and ordnance hazard zones require target complexes to be located well inside range boundaries, making visually impacted areas difficult to see from the ground. Continued use of the proposed Cabeza Prieta wilderness area would add additional dart debris in the area which might be seen by 10 of the 1,500 to 1,700 annual visitors to the LAFR and Cabeza Prieta NWR.

#### WILDERNESS

Flights over the proposed Cabeza Prieta wilderness area could produce loud noise that would impact wilderness users and wildlife. The area is also considered unsafe for use by the general public due to the presence of ordnance.

## HAZARDS AND SAFETY

Sonic booms will be an impact that cannot be mitigated. Over-pressures on the ground at the boom cut-off-point, however, are significantly below reported levels for direct physiological effects. Studies to date are inconclusive on human and animal response to the anticipated over-pressure and noise.

The safety hazard of unexploded ordnance cannot be mitigated within sound environmental means. Complete ordnance removal would require subsurface investigation, which would highly impact soil, vegetation, and wildlife.

The potential for a range fire also cannot be completely mitigated.



## CHAPTER 6

### RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Long-term environmental gains from the continued land withdrawal include multiple agency interest in the natural and cultural resources (soils, water, geology, minerals, vegetation and wildlife, and cultural resources) of the area; continued protection of these natural and cultural resources from exploitation through continued limited public access; and holding natural resources in reserve for possible future use. If the land withdrawal were not renewed, the land would revert to BLM administration. According to the Arizona Game and Fish Department (Carr, 1976),

"This area, while it may appear as a desert wasteland with little wildlife value, has a considerable number of wildlife species present. It is also valuable because of its defacto wilderness aspect. The restricted access imposed by the Department of Defense has created an area which has few of the human impacts normally associated with Arizona deserts."

Although proposed action would restrict the short-term use of resources, instead of depleting them, it would place them in reserve for future generations.



## CHAPTER 7

### IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The Luke Air Force Range (LAFR) land withdrawal would result in few irreversible and irretrievable commitments of resources. Continuing the mission of LAFR would require expending of manpower, funds, construction materials, water, and energy, which are not recoverable.

#### LAND USE

Unexploded ordnance above and below the surface (as deep as 20 feet) will remain a potential hazard for an unknown period and constitutes an irreversible and irretrievable land use commitment. Records do not show the number or location of this ordnance, making locating and disarming it monumental and expensive. Buried unexploded ordnance will remain hazardous until recovered and with time will become even more sensitive to detonation. No sterilization features are designed in explosive ordnance used on the LAFR, and this safety hazard cannot be neutralized with existing technology. Future retrievability of resources will depend upon weighing values to be recovered against the cost of decontamination for each proposed change.

Complete ordnance removal requiring subsurface investigation would severely impact the soil, vegetation, and wildlife because of the destructive procedures required for subsurface clearance.

#### SOILS AND WATERSHED

Military training operations could result in soil erosion and, when aided by natural forces, might result in loss of the topsoil in certain areas.

#### ECOSYSTEMS

Habitat loss resulting from military training on the LAFR would be an irreversible commitment of natural resources. These localized impacts on ecological interrelationships, however, would not alter the character of the entire ecosystem and would last only as long as the effects of soil and vegetation disturbances.

#### CULTURAL RESOURCES

The modification of cultural resources, particularly archaeological sites, through excavation, vandalism, or destruction may constitute an irreversible and irretrievable commitment, since individual cultural resources can never be replaced.



## CHAPTER 8

### ALTERNATIVES TO THE PROPOSED ACTION

The training of tactical fighter pilots is a continuing program requiring a range facility to practice ordnance delivery on land targets and engage simulated enemy aircraft in aerial combat. New developments in tactical warfare have focused on sophisticated aircraft with reduced noise and emissions, complex but highly accurate delivery systems, sophisticated defensive systems, and penetration devices/tactics. Changes in weapon systems and tactics have also affected the use of LAFR by improving targets, building realistic simulated threat environments, improving training, and placing more demand on the use of LAFR.

Some alternatives to the proposed action are related to total loss of the range, whereas others consider the loss of only part of the range. No alternative, however, would involve the loss of airspace over LAFR. Some operations could continue without the need for the land, but the continued use of the airspace without use of the land would seriously degrade LAFR's training capability.

#### ALTERNATIVE 1: NO ACTION--LETTING THE WITHDRAWAL LAPSE

Under no action, areas A, B, and C (figures 1-2 and 1-3) would be removed from LAFR, amounting to a loss of 1,502,792 acres. This loss would involve (1) the Gila Bend Segment's live firing air-to-air range; (2) the Yuma Segment's air-to-ground targets (Rakish Litter and Panel Stager); (3) the maneuvering area for arrival and departure in the Yuma Segment; (4) the West Coast Air Combat Maneuvering Range; (5) the Yuma Segment's air-to-air firing range; (6) the MX test site area; (7) the Gila Bend Segment's air-to-air range; and (8) the Gila Bend Segment's manned and tactical air-to-ground ranges.

#### IMPACTS ON MILITARY OBJECTIVES

The impact on Luke AFB and all the users of the air-to-ground and air-to-air live fire areas would be significant. The following users would be most severely affected:

##### Air-to-Ground

355 TFW, 432 TDG Davis-Monthan AFB  
58 TTW, Luke AFB  
405 TTW, Luke AFB  
16 TFTG, Air National Guard, Tucson  
302 SOS (AFRES), Luke AFB  
MCAS Yuma, Yuma AZ  
NAS Miramar, San Diego CA  
Other ANG/AFRES/USN Units

##### Air-to-Air

58 TTW, Luke AFB  
405 TTW, Luke AFB  
49 TFW, Holloman AFB  
82 TTW, Williams AFB  
MCAS Yuma, Yuma AZ  
355 TFW, Davis-Monthan AFB  
Other ANG/AFRES/USN Units

## NO ACTION

Taking no action to renew the withdrawal would restrict training to air combat maneuvering. Basic fighter maneuver, transition, and air-to-air live fire support requirements would have to be relocated to another base having an air-to-ground capability. One alternative is to temporarily locate units at an installation with air-to-ground bombing/air-to-air fire capability. The other alternative is air-to-air refueling to another range using tanker support. Either alternative would entail increased operating costs. The operations and maintenance budget of all the air-to-ground users of LAFR would be adversely affected.

The nearby ranges with air-to-ground capability are Nellis Air Force Range (NAFR), currently undergoing a similar land withdrawal action, and White Sands Missile Range (WSMR).

Both NAFR and WSMR are at or close to capacity and cannot accept more than 5 percent of the LAFR tactical training operations without delaying training time for their current users. Therefore, the loss of the LAFR would result in the loss of all the tactical air-to-ground training currently provided at the range. This loss would seriously impact the tactical training of Air Force fighter pilots.

Loss of the land would require the military to remove targets, buildings, ordnance, and instrumentation and communication facilities to make all or part of the land suitable for public use. Such removal would be extremely expensive. Clearing the land to insure removal of all ordnance would be a major undertaking, and 100 percent removal might not be attained. Some areas could never be returned to BLM for public use because of ordnance contamination.

The impact on future planned expansion on the range is unknown. Whether some or all of these projects would be moved or cancelled depends on mission changes. Closing LAFR would interfere with any planned expansion in capabilities.

### IMPACTS ON THE HUMAN ENVIRONMENT

Should the land not be withdrawn, the area's ecological, cultural, and natural resources could be used by the public. Mineral and archaeological exploration potential would also increase. The inability to insure 100 percent removal of all unexploded ordnance, however, might restrict public use of LAFR land.

Limited access to the public and little human influence benefit the desert ecosystem and must be balanced against the expected reduction in noise and improvement in air quality.

## NO ACTION

The expected improvement in wildlife habitat might be lessened if significant public recreation is allowed. The long-term impact of noise and air pollution on endangered species from current operations is unknown. Short-term impacts do not appear to be significant.

Historic and archaeological sites would no longer be disturbed by hazardous air-to-ground delivery operations. Known cultural sites, however, could be subject to vandalism should the military discontinue use of the land.

Land use would not greatly change. Mineral exploration would be limited, but commercial and public access to mineral sites would increase. Without water, suitable grazing areas would support few livestock. Moreover, if current interest in protecting the Sonoran pronghorn antelope continues, little grazing will be allowed. The presence of unexploded ordnance would restrict areas suitable for outdoor recreation.

The noise level would decline, and air quality would improve. Even though sorties would decline significantly, sonic boom problems would probably continue at the present rate. Noise would not significantly decline, nor would air quality increase at the operating base.

Socioeconomic impacts would be felt at all the bases affected by the decision to return the land to public use. Units whose mission is primarily air-to-ground operations would have to relocate. Civilian and military personnel at Luke, Davis-Monthan, and Williams AFBs, Arizona Air National Guard (ANG), and Yuma MCAS would decrease by 30 to 50 percent, depending upon the installation and the missions of its flying units.

Personnel losses, in turn, would decrease buying power in the affected areas. Supported by military activities, the local economy would be affected to some degree, depending on the size of the reduction. Gila Bend AFAF would be closed, and the loss of \$4.8 million in revenues, decrease in population, and increase in unemployment would significantly affect Gila Bend.

The regional impact would vary. Phoenix and Tucson could more easily absorb the economic loss and unemployment than could Yuma. The Arizona Air National Guard unit would have to be provided with a different mission, one supported by the remaining airspace.

ALTERNATIVE 2: REDUCE THE SIZE OF THE WITHDRAWAL

IMPACTS ON MILITARY OBJECTIVES

The loss of land would compromise safety or decrease LAFR's operational capability. LAFR's ability to accommodate the everchanging and unanticipated mission requirements is of primary importance in range use, planning, and availability.

Air Force ranges have three requirements for land. First, land is needed to develop targets and target arrays for aircrews in air-to-ground operations. Live and inert ordnance delivery is required on these targets. The targets must vary in size and location to realistically simulate combat.

Second, land is needed for locating threat equipment and personnel to support such equipment. The land must be free from ordnance and restricted from any ordnance deliveries within a 3-mile radius of any equipment.

Finally, land is required for safety to adequately separate aircraft on the ranges and to protect civilian and military populations from inadvertent bomb releases.

Begin targets have been sited to take best advantage of the suitable land, and no area on the LAFR could be eliminated without sacrificing either air-to-air or air-to-ground training objectives. Targets cannot be placed on the Cabeza Prieta NWR or where the elevation slope exceeds 20 percent, eliminating 40 percent of the Gila Bend Segment occupied by mountains. The remainder of the land is used as a buffer zone to separate aircraft.

Still LAFR does not have enough land to allow all ranges to be operated at the same time. When either Range 3 (manned) or ETAC is used, the other range cannot be used. Overruns on Target 5 result in unauthorized entry into the air-to-air, NTAC, or Range 4.

Reducing the size of the range would adversely compact or concentrate the system into a relatively small area, making the combat environment unrealistic and decreasing safety margins with the civilian community. In addition, a smaller size would drastically reduce the capability to support the many users of the range and other essential wargame exercises. Loss of realistic training would result in the United States being less prepared to protect national interests.

An unavoidable impact of reducing the size of the withdrawal would be the reorientation or relocation of range targets to insure maximum safety on less land. Relocation would allow fewer sorties to be flown because of range scheduling conflicts. Additionally, untouched desert ecosystems would be disturbed during relocation, and new areas would become contaminated with unexploded ordnance and debris.

The environmental consequences of range relocation could be significant considering that present targets occupy 380,000 acres.

The amount of land considered for withdrawal does not depend solely on direct operational requirements. Operational requirements dictate land needs. To support these requirements, however, construction, upkeep, and ordnance removal on the ranges is needed. These activities require closure of air-to-ground operations and force aircrews to deploy or attack in another area, requiring more targets on the range.

If the size of the withdrawal is reduced, an extensive EOD survey and clearance operation would be required to insure that the area is free of any unexploded ordnance. Ordnance clearance is costly and would disturb a significant portion of the creosotebush-bursage vegetation community.

The reduction in size of the withdrawal would be detrimental to mission requirements for the following reasons.

- The large range/target areas provide the capability for realistic entry and exit scenarios to be flown.
- The variety and complexity of LAFR targets are essential for the realistic combat training environment.
- A safety margin/buffer zone is required to adequately protect the adjacent civilian population.
- Decreasing range space would require severely restricting the scope of or deleting the majority of these missions.
- To maintain current mission levels, any reduction in the size of withdrawal would require development of a new range or shift forces to installations where this capability exists.

Problems and restrictions for developing new ranges are the same as those faced by continuing the withdrawal of LAFR lands. Any land reduction will seriously impact operations on the range, reducing range availability and training.

#### IMPACTS ON THE ENVIRONMENT

Should some of the land not be withdrawn, some of the ecological, cultural and natural resources of the land would be available for public use. Enhancement of wildlife species might be lessened if significant public use is allowed. Mineral and archaeological exploration potential would increase slightly, depending on the size of returned acreage. The impossibility of insuring complete removal of all unexploded ordnance on the range, however, would allow only limited, controlled public use.

### ALTERNATIVE 3: ESTABLISH A NEW RANGE IN ANOTHER AREA

#### IMPACTS ON MILITARY OBJECTIVES

Establishing a new range in another area would be extremely expensive and time consuming and would involve planning, availability of land and airspace, and construction of the range and the support base. The Air Force would have to acquire land free of population or in a sparsely populated area, airspace free of airways, and weather similar to that found in southwest Arizona. If the land is not government owned, buying or leasing it would add to the total cost of acquisition. Finding another area meeting all three criteria to the extent that LAFR does would be virtually impossible. Weather is a prime factor. Any less favorable weather conditions would adversely affect all flight training.

During the planning and development of the new range, interim procedures would be required until the new range is established. Action would have to be taken to delay full closure of LAFR to allow the continuation of military activities on the range or operate under the staging concept. For the new range, new targets would have to be constructed, access roads developed, buildings and support equipment provided, and money and personnel made available. Establishing a new range could adversely affect the military operating budget.

#### IMPACTS ON THE ENVIRONMENT

Moving the range would shift impacts from one area to another. Instead of contaminating one area with ordnance, two areas would be impacted. Air quality, noise, and land use could be adversely impacted. Since not all ordnance on LAFR would be cleared, land use restrictions would still exist. A new range would also impose land use restrictions and, on balance, cause even greater amounts of land to be removed from public use.

## CHAPTER 9

### CONSULTATION AND COORDINATION

#### PAST COORDINATION

Before the preparation of this environmental impact statement (EIS), initial conferences were held between BLM and Luke AFB. From June 1976 until June 1977, preliminary environmental assessments were coordinated between the two agencies. When an EIS was determined to be required (approximately May 1977), an EIS preparation plan was submitted to BLM Washington and Luke AFB environmental authorities to begin coordination and establish an Air Force/BLM team. Included in this initial plan (July 8, 1977) is the public participation plan, which includes early notification, a public information meeting, distribution of EISs, a public hearing, news releases, and public letters or notices.

An early notification letter was distributed to 350 individuals and organizations on September 26, 1977. Additionally, all applicable attachments and addresses for response were included.

Notice was published in the Federal Register (Vol 42, No. 92, May 12, 1977) concerning the Air Force and BLM preparatory action for continued range withdrawal. On February 20, 1978 the notification letter for the public information briefing was mailed.

The public information briefing was held on March 9, 1978. Sixty individuals attended, but none represented the media. The presentation included an introduction of Air Force and Marine Corps officials by a BLM representative to reinforce the fact that the proposal was a joint BLM/Air Force effort.

An invitation from a State representative from Arizona's Ajo Congressional District (which adjoins LAFR) led to an additional public briefing held by Air Force representatives on April 28, 1978.

During this preparatory process, BLM representatives and members of the Luke AF Environmental Protection Committee maintained ongoing consultations.

Letters were written to agencies, groups, and individuals. The media, agencies and individuals were also contacted by letter for the first public information meeting. The letters of notification included maps of the proposed withdrawal area and procedures for communicating with BLM, FWS, and Air Force officials. All relevant legislators, State,

local and Federal agencies, were contacted. A list of groups and citizens contacted may be inspected by the public at the BLM Arizona State Office, Phoenix.

The following is a list of written responses to the notification letter, including a brief summary of the comments.

a. Sierra Club, Grand Canyon Chapter. A request to place conservation chairman on mailing list. (Complied with.)

b. Arizona House of Representatives (Jim Hartdegen, State Representative District 6). A formalization of the request for an additional public information briefing.

c. Yuma Natural Resources Conservation District. A request for consideration of burro management should any burros intrude into the LAFR.

d. Arizona State Land Department. A request for aerial studies of grazing areas near LAFR.

e. Desert Botannical Garden. A request for the complete text of withdrawal proposal to clarify effect on fauna.

f. Arizona Department of Transportation. A request to consider improving range clearance communication procedures for general aviation aircraft through LAFR airspace.

g. National Oceanic and Atmospheric Administration. A summary of climatological factors in the LAFR.

h. City of Yuma. An expression of agreement with national defense needs of the LAFR with a request not to further restrict usable recreation areas.

i. National Park Service. A summary of related environmental studies in the LAFR area, with suggested points of address in statement of land withdrawal.

j. Bureau of Indian Affairs - Papago Indian Agency. A letter of opposition to the use of public lands by the Air Force because of overflights of the Sells airspace enroute and departing LAFR.

k. The Wilderness Society. Confirmation of properly conducted military operations helping to protect wilderness areas.

l. Advisory Council on Historic Preservation. A request to survey area under proposed withdrawal for sites eligible for inclusion in the National Register of Historic Places.

## CONSULTATION AND COORDINATION

m. Environmental Protection Agency. An offer to participate in coordinating efforts during the environmental impact process.

n. Maricopa Association of Governments - Transportation and Planning Office. An offer to exchange information regarding a water pollution study being conducted in western Maricopa County.

o. Heritage Conservation and Recreation Service. No significant comments.

p. Arizona Department of Health Services. No significant comments.

q. Glendale Chamber of Commerce. A statement supporting withdrawal of LAFR property to maintain Luke AFB in the Glendale area.

r. Maricopa County Planning Department. Informational letter offering "MX Buried Trench Construction and Test Project" DEIS for information source for LAFR Continued Withdrawal EIS.

s. Ernie Jordan. Letter of support regarding grazing areas next to LAFR.

t. Rosemary Elkins. A request for completed EIS.

u. State of Arizona Bureau of Geology and Mineral Technology. Letter of opposition to any action that precludes geologic studies and resource reconnaissance and appraisal.

v. Yuma County Board of Supervisors. No significant comments; expression of approval.

w. Arizona State Land Department. A request for coordination in preparation of statement with county and city officials and the Governor's Office of Economic Planning and Development.

x. Newmont Exploration Limited. A request to review prepared EIS.

y. City of Yuma. Offer to cooperate regarding exchange of information on the encroachment of Yuma on the boundaries of LAFR.

z. Arizona Commission of Agriculture and Horticulture. A request that plants covered by the Native Plant Law be salvaged if possible.

aa. Arizona Game and Fish Department. A request that EIS indicate importance of LAFR area for wildlife.



## CHAPTER 10

### NATIONAL DEFENSE CONSIDERATIONS THAT MUST BE BALANCED AGAINST ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

Luke Air Force Range (LAFR) is a major DOD bombing and gunnery range used jointly by the United States Air Force, Army, Navy, and Marine Corps, as well as by aircrews from nations with whom the United States Government has agreements to train tactical fighter aircrews and exercise tactical weapons systems. The range can simulate a combat environment through electronic countermeasures and realistic aerial gunnery, bombing practice, and air combat maneuver training. Without this capability, the ability of the DOD to adequately train combat forces would be adversely affected.

Statistics prove that the survivability of the tactical aircrew in combat varies directly with the quantity and quality of its training. The loss of LAFR would result in a high combat attrition rate and seriously impair the national defense posture of this country. It would also affect the multinational training agreements in which the United States Government is involved.

Continued withdrawal of LAFR would have little impact on the environment and the public. The potential of exploiting the recreational, archaeological, mineral, and wildlife resources is limited by the extremely expensive and unreliable clearance of all unexploded ordnance from the range. Even if the range were returned to the public, many years and extensive program development would be required before LAFR could be released for public use. Continued withdrawal protects the wildlife and preserves archaeological sites through stringent access controls and range patrol. Air quality is expected to continue to improve with advanced aircraft.

Renewal of the withdrawal would continue to provide some economic stability for the area. Future mineral surveys of the range may show mineral deposits that could be vital national resources. Should mining of these minerals become necessary, a mineral management plan will be developed.

In summary, alteration or deletion of this essential training facility would seriously jeopardize the national defense posture as well as significantly reduce our future combat capability. This factor alone outweighs the limited, long-term benefits of returning the land to the public.



## GLOSSARY

### Abbreviations

The following list presents the most frequently used abbreviations in this EIS. Most abbreviations used only once or twice are not listed.

|        |                                                |
|--------|------------------------------------------------|
| ACM    | Air Combat Maneuvering                         |
| ACMI   | Air Combat Maneuvering Instrumentation         |
| ACQR   | Air Quality Control Region                     |
| AGL    | Above Ground Level                             |
| AFAF   | Air Force Auxiliary Field                      |
| AFB    | Air Force Base                                 |
| AG&FD  | Arizona Game & Fish Department                 |
| BLM    | Bureau of Land Management                      |
| dB     | Decible                                        |
| DOI    | Department of the Interior                     |
| DOD    | Department of Defense                          |
| EO     | Executive Order                                |
| EOD    | Explosive Ordnance Disposal                    |
| EW     | Electronic Warfare                             |
| FAA    | Federal Aviation Administration                |
| FLPMA  | Federal Land Policy and Management Act of 1976 |
| FWS    | U.S. Fish and Wildlife Service                 |
| LAFR   | Luke Air Force Range                           |
| MCAS   | Marine Corps Air Station                       |
| MLT    | Mobile Land Target                             |
| MOU    | Memorandum of Understanding                    |
| NEPA   | National Environmental Policy Act of 1969      |
| NARR   | Nellis Air Force Range                         |
| NM     | Nautical Mile                                  |
| NWR    | National Wildlife Refuge                       |
| NTACR  | North Tactical Range                           |
| OLF    | Outlying Field                                 |
| PL     | Public Law                                     |
| PLO    | Public Land Order                              |
| STACR  | South Tactical Range                           |
| TOSS   | Television Optical Scoring System              |
| TTL    |                                                |
| USN    | United States Navy                             |
| WCACMR | West Coast Air Combat Maneuvering Range        |
| WISS   | Weapons Impact Scoring System                  |
| WSMR   | White Sands Missile Range                      |

## Terms

Annual Plant: a plant that completes its life cycle and dies in 1 year or less (Range Term Glossary Committee, 1974).

Alluvial: relating to or formed by water carrying and depositing rocks, soil, and other material.

Alluvial fan: a sloping fan-shaped mass of sediment deposited by a stream where it emerges from an upland onto a plain.

Aquifer: a water-bearing bed or layer of permeable rock, sand, or gravel capable of yielding considerable amounts of water.

Bahada: a broad alluvial slope extending from the base of a mountain range out into a basin and formed by the coalescence of separate alluvial fans.

Caliche: a whitish accumulation of calcium carbonate in the soil profile, which may occur as a soft, thin soil horizon; as a hard, thick bed just beneath the solum; or as a surface layer exposed to erosion.

Cochise Culture: prehistoric culture of southern Arizona and New Mexico believed to have begun over 10,000 years ago and to have lasted until 500 BC or later. The Cochise culture's economy was based on gathering wild grain, nuts, and roots rather than hunting (Wormington, 1947).

Decible: the common unit for measuring the level of sound or of electric power in a sound-producing apparatus. Audible noise is usually measured on an "A" weighted scale, which is a logarithmic scale used to measure the value of sound pressure in decibels.

Drones: electronically and remotely controlled, nonpiloted aerial vehicles used as targets.

Endangered Animal Species: any animal species in danger of extinction throughout all or a significant part of its range. This definition excludes species of insects that the Secretary of the Interior determines to be pests and whose protection under the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man.

Ephemeral Streams: streams flowing during rainstorms or peak snowmelt. Channels are poorly defined, and flow usually lasts less than 10 percent of the year.

Evapotranspiration: the loss of water by transpiration from plants and evaporation from the soil.

Fugitive Dust: temporary dust, as from construction.

Hohokam: Prehistoric agricultural Indians who occupied the drainages of the Salt and Gila Rivers of southern Arizona. The Hohokam culture is believed to have lasted from 300 to 1400 AD. The culture's greatest achievement was its development of a complex system of channels for irrigated agriculture.

Lithic: a stone or rock that may be either abraded into the proper form for use as a tool or shaped by knocking pieces off.

Mach Number: The ratio of the rate of motion of a body such as an airplane to the rate of motion of sound in air at the same place. When an aircraft reaches Mach 1, it creates a sonic boom.

National Register of Historic Places: a register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior.

Nautical Mile (NM): the geographic (or nautical sea or air) mile equal to 1/60 of 1 degree of the earth's equator. In U.S. coast survey use, 1 NM = 6,080.2 feet.

Ordnance: Ammunition, either live or inert, which impacts the surface, is delivered on a target, or remains after impacting the surface or target.

Particulates: fine liquid or solid particles, such as dust, smoke, mist, fumes, or smog, found in the air or emissions.

Perched ground water: ground water separated from an underlying body of ground water by unsaturated rock. Its water table is a perched water table.

Perennial Plant: A plant that has a life cycle of 3 or more years (Range Term Glossary Committee, 1974).

Perennial Stream: a stream that flows throughout the year.

Pediment: a wide, gently sloping bedrock surface with low relief, which is usually at the base of a steeper slope and is often covered with alluvial sand and gravel.

Personal Income: in this EIS personal income refers to salaries and wages; other labor income; business and farm proprietors income; dividends, interest, and rent; and residence adjustment (Valley National Bank of Arizona, 1979).

Playa: a desert lake basin.

Public Land: formal name for lands administered by the Bureau of Land Management.

Shard: a fragment of a pottery vessel.

Sortie: an aircraft flight that begins by a single takeoff and ends by a full stop.

Staging Area: an area, site, or location where materials and personnel are temporarily placed before an operation. One or several locations may be selected as temporary bivouac areas. At the end of the operation, the staging area is abandoned.

Strafe Target: a target on a manned or tactical range designed for use by a gun mounted internally or externally in an aircraft.

Talus: a slope formed by accumulating rock fragments at the foot of a cliff or ridge. Talus also refers to the rock debris itself.

Threat Capability (Equipment): the simulation of an enemy antiaircraft installation. A threat capability allows trainees to practice evasive actions against such a threat.

Total Dissolved Solids: Salt--an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts. High TDS solutions can change the chemical nature of water, exert varying degrees of osmotic pressures, and often become lethal to life in an aquatic environment.

Water Bar: a ridge placed across a road or trail on a hill to divert rain water to one side and thus reduce erosion.

Wilderness: an uncultivated, uninhabited, and usually roadless area set aside for preservation of natural conditions.

Xerophyte: a plant structurally adapted to growing in dry or desert conditions, often having a greatly reduced leaf surface to prevent water loss; thick, fleshy parts for water storage; and hairs, spines, or thorns for protection from animals.

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